RAILROAD GAZETTE

FRIDAY, MARCH 22.

CONTENTS.

Contributions.

Long Trains and Shocks.

WATERTOWN, N. Y., Feb. 26, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your editorial comments on the brake tests on the Chicago, Santa Fe & California, you say that the terrific shocks were caused by the slack in the couplings, and that if the cars had been equipped with close couplers they would not have occurred. In the Burlington tests, May, 1887, the Westinghouse train was equipped with the Janney close couplers, yet the only three stops they made without using electricity produced even more terrific shocks than those on the Chicago, Santa Fe & California Instead of loose slack I attribute these shocks to the fact that the new Westinghouse valve causes the brakes to be applied to each car with nearly full force before the following ones are braked at all; hence, the forward cars are solidly braked, while the rear ones are running at full speed unbraked. If the brakes could be applied so rapidly that each car had not time to close up the slack between it and the car forward, there would be no shock. This seems to have been done on the exhibition train which the Westinghouse Company sent through the country a year ago.

The best braking would be where all the brakes were applied simultaneously, as was done at Burlington by electricity on the Westinghouse, Carpenter and Eames trains. Next to that would be where the brakes were being applied to several cars at a time, so that the brake may begin to go on, say the tenth car, before it is on the first car with full force. This was the case with the Eames train when used without electricity. In but one of the stops made with the mixed train (33 loaded and 17 empty) did the slidometer move 7 in., while in some of them it did not move at all.

Is not the experience of the Chicago, Santa Fe & California liable to be repeated any day where such long trains are run?

A. P. MASSEY, Treas. Eames Vacuum Brake Co.

[Comment on this letter will be found in the editorial column.]

Time Allowance at Meeting Points.

TO THE EDITOR OF THE RAILROAD GAZETTE:

It is strange that no exceptions have been taken ere this regarding the statement below, taken from Gen. E P. Alexander's article on railway management in the January "Scribner." The article in question reads: "When one train only is behind time, the opposing train of the same class will wait for it a specified time, usually ten minutes, and five minutes more for possible variation of watches, then go ahead, keeping 15 minutes behind its schedule," (p. 34).

This rule may have been in force during the primitive days of railroading, but, if I am correct, has long since been relegated to oblivion. As I understand the practice to be now, the train not having the right of track arrives at the meeting point 5 minutes before the time of train having the right of track, which latter when arriving at the passing point does not wait on the other but goes straight ahead.

EMILE LOW.

[General Alexander certainly cannot mean to refer to the best modern practice, for the Time Convention code of Oct. 12, 1887, which has been nominally agreed to by a large majority of the best roads, and has been substantially adopted by many, allows no time whatever for clearance. But to say that the rule has been consigned to oblivion is by no means true. Many roads which adopt the uniform code alter it in this particular, and many others adhere to their old practice. A certain road which is counted among the most enterprising in the country in many respects, requires 30 minutes' clearance on some of its branches. The train not having right of road must arrive at the meeting point 10 minutes before the ruling train is due, and the latter must run 20 minutes behind time when it does not find the other at the proper meeting place. This is probably the extreme of *primitivism*, but the allowance of even 10 minutes is evidently considered old-fogyism by the majority of the Time Convention. Assuming that 5 minutes is the most general figure, where leeway is provided, our correspondent's understanding of the present practice is now true of only a portion of the roads, and this portion is becoming smaller. The greatest need has been to secure uniformity, and this the uniform code is slowly doing. Instead of having the subordinate train or both trains calculate to wait, those who adopt this code now generally require all the waiting to be done by the ruling train. This is the most rational plan, for in normal working, when both trains are on time, no time whatever need be wasted by either one. If the subordinate train allows, say, 5 minutes, it throws away that amount of time every day, year after year.—EDITOR RAILROAD GAZETTE.]

Hot Boxes and "Anti-Friction Metal."

No. 11 WALL STREET.
NEW YORK, March 18, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of March 15, the correspondent who signs himself "G. A. H," and who dates his letter from St. Louis, Mo., March 7, 1889, complains of the frequent delays to passenger trains caused by hot boxes. He asks, "Is there not a metal which manufacturers guarantee no hot boxes or no pay?" In answer to this, I would say that we will consent to furnish any railroad with a sufficient quantity of our metal, with the distinct understanding that a thorough trial shall be given the same, and that we will ask no pay if our metal does not perform all we claim for it, namely: that it will not heat or cut a journal. We consider it an absolute impossibility to have a hot box on any train where the bearings are properly lined with our metal.

I request you to kindly publish this letter, not as a free advertisement (of which I, fortunately, stand in no need), but as a direct reply to your correspondent who seems to think that, either there is no metal of the kind in the market, or else that manufacturers have not sufficient confidence in their own invention to guarantee the same, in the way indicated.

E. WOLTMAN.

The Block Signal System.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read, with great interest, the various articles in the pages of the *Railroad Gazette* within the past few months, pertaining to the block signal system, especially the editorial on "Permissive Blocking," in the issue of Jan. 25, and have thought that a few remarks from one who has had experience in working the block might be of interest.

"Langdon's" opinion of the block signal (See letter, Aug. 24, 1888) is that of a trainman, and it is one that is very prevalent among trainmen. The fact that such a view is so prevalent only goes to show that there are reasons for it, without signifying, as he would have people believe, that the signal system is a failure. It shows that there are defects in the system, as it exists now, but it does not show that these defects are insurmountable, nor that they cannot be eradicated.

The principle of the block signal system is that so long as one train is on a block another cannot enter it. In the face of this they nevertheless do so enter, every now and then, and sometimes collide with the train in advance. This is not the fault of the system, but the failure to carry the system out, and it is these failures that cause a widespread opinion among trainmen such as "Langdon" holds. Those who are most familiar with the block signal system are also familiar with the causes that lead to these failures, but they are difficult ones to overcome, and in most respects have yet to be overcome. The employment of experienced and careful operators, and the use of the absolute block only, are the surest guarantees of safety, and to the failure to carry out these points can be traced most of the accidents that have resulted from the block signal, and brought reproach upon it. Theoretically it is an absolute protection, but in practice it is not; what is wanted is to bring it up to the theoretical standard in practice.

There is no question that an absolute block system will cause delays where the traffic is heavy, and trains will frequently have to come to a standstill when they could have moved on slowly had no signal existed; but this can be partly overcome by shortening up the blocks. To save the additional expense of this, and at the same time to overcome the delays, the *green signal*, or permissive block, is allowed for the movement of freight trains only. Forbidding this advantage to passenger trains shows plainly that the danger of the practice is fully appreciated: rather than incur the delays that would be caused by an absolute block, where the signal stations are located a long distance apart, the risk of an occasional wreck is preferred. I do not suppose there could be any one found willing to admit this, but that is what it amounts to; and so long as this practice is continued, so long will there be an occasional wreck, and trainmen will continue to mistrust the signal system, and pronounce it a failure. Wherever the block signal system is in use, and anything but an absolute block allowed, the danger of an occasional mishap is greater than if no signal system were in use at all, for there is not that promptness on the part of flagmen to go back and protect their trains that there is where the flagman has nothing to depend on but himself. For there is no use of denying the fact, flagmen are not so careful where the block system is used as where it is not. They will depend on the operator, and, on the other hand, the operator depends on the flagman; the responsibility becomes divided, and divided responsibility is a dangerous thing. The only thing to do is to make the block signal an absolute protection, so that no matter whether the flagman goes back to protect his train or not, there will still be no possibility of a collision. It may as well be set down for a fact that it is of no use to expect as much out of flagmen where the block signal is in use as where it is not; they will not perform the very service for which they are employed, so that in this respect "Langdon" can set it down that trainmen are as much to blame for failures of the block system as anybody else.

What is wanted is for the block signal never to fail, and then I feel sure that "Langdon" will believe that it is a good thing. We want it as impossible for a wrong signal to be given as it is for a wrong switch to be shifted in an interlocking system. The safety of the block signal as now in use is entirely dependent upon the operator, and no one realizes more clearly than he the possibility of his making a mistake now and then. Whenever it shall be made a mechanical impossibility to give a wrong signal as long as there is a train on the block, we shall have the same security that interlocking has accomplished for junction points. Meanwhile great good can be accomplished in the line of improving the grade of operators, and in allowing nothing but the absolute block to be used. As it is now we get all of the bad features of the block signal and not enough of the good.

S.

Transfer Tables on the Pennsylvania Railroad.

We illustrate by the accompanying cuts two of the most complete and ingenious transfer tables in this county. They are identical in their general arrangements, except that one is driven by a wire rope and the other by electricity. The rope transmission is used at the Camden shops of the Pennsylvania and the electric transmission at the Altoona shops, on the same road. The electric motor is of the Sprague make and is almost identical with the one which has been in successful operation at the Aurora car shops, on the Burlington, for the past two years.

These tables were designed in the Mechanical Engineer's office at Altoona. The machinery for moving the table was designed by the Yale & Towne Manufacturing Co., of Stamford, Conn.

The table (see figs. 1, 2 and 3), driven by the wire rope, at Camden, occupies a pit which is about 300 ft. long, 60 ft wide and 27¾ in. deep from the top of the main rail to the top of the sub-surface rail at the bottom of the pit. Fig. 1 is a plan of the table showing arrangement of the truck wheels and shafting. This table is virtually carried upon four large trucks running on tracks 4 ft. and 9 in. gauge. The spread of the centres of the truck wheels in this truck is 14 ft. The track, running crosswise of the trucks and carrying the cars and locomotive, is placed centrally between the truck wheels. The load is transmitted from the centre of the truck to the axles by 15 ft. I-beams, weighing 20 lbs. per ft. This I beam furnishes a base for the attachment of the bearing of the driving shaft. Running longitudinally with the table, *i. e.*, crosswise of the pit and underneath the main rails of the track, are placed 12-in. I-beams, weighing 42 lbs. per ft., which carry the load from the centres between the trucks to the centres of the trucks.

Fig. 1 shows a complete plan of the table on which can be seen the driven capstan *A*, at the centre of the table, and the idle capstans *B* and *C* at the ends of the table These capstans are also shown in fig. 3, which is a complete side elevation of the table. The wire rope, as it passes on to the table, is shown by the heavy black line connecting the rope pulleys. It will thus be seen that it passes on the pulley *H*, around *K*, over the carrier *F*, around *D*, over the carrier *E*, around *K*, over the carrier *G* to the side of the pit. The operation of the driving devices is given later on in this description.

The exact method of attaching axle boxes to the I-beams is shown in fig. 4. The axles are the standard iron freight car axle used on the Pennsylvania road. They have 4 × 8 in. journals and are 6 ft. 4¾ in. long between centres of the journals. The 33 in. wheels mounted upon these axles are exactly the same as those used in freight service. The alteration necessary in the axle-box in order to securely attach it to the I-beams is shown in fig. 5. There are two bolt holes in each side of the box, instead of one as usual. These holes are planed out to fit the I-beams and the strap above the box, as shown in fig. 5.

The functions of the various parts and the operation of the machinery may be briefly described as follows. See figs. 6 to 9. The $\frac{7}{16}$ in. steel wire rope, which transmits the power from the stationary engine, passes on to the large wire rope pulley *B*, at the point *A*, and traverses around it in the direction indicated by the arrow to the point *A'*, where it passes to wheel *D* at *A''*, traversing around this wheel in the direction of the arrow to the point *A'''*, thence to *A''''* on the lower wire rope wheel at *B*, and off at *A* to the carrying pulleys along the side of the pit.

The foregoing shows the manner in which the power of the stationary engine is transmitted to the machinery on the table by means of the wire rope. That which follows shows the details of the transmission of power to the machinery. Upon the same axle which serves as a carrier for the wire rope pulley *D*, is mounted on a bevel spur gear *F*, which drives a bevel pinion *G*, mounted on a horizontal shaft *H H*. On this shaft is fixed a bevel gear *J*, which drives another and equal bevel gear *K*, on a horizontal shaft *I I*, placed at right angles to *H H*. The bevel gear *F* being larger than *G* and *J*, and *K* being of the same dimensions, it follows

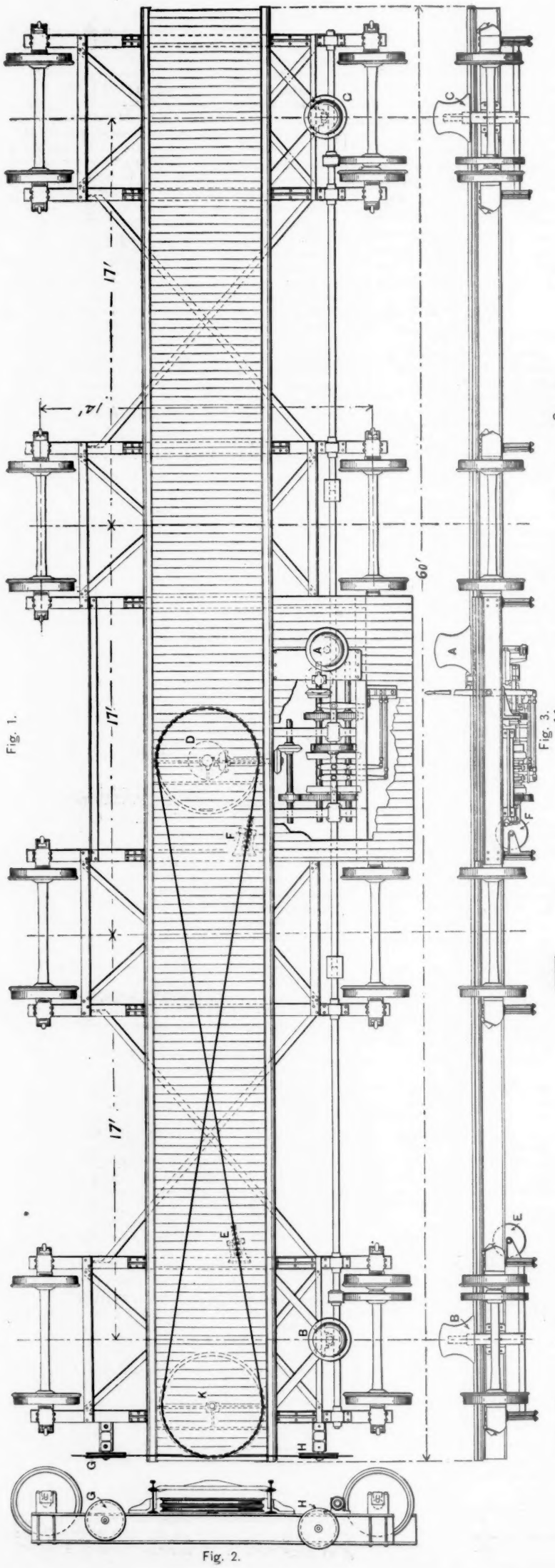


Fig. 1.

Fig. 2.

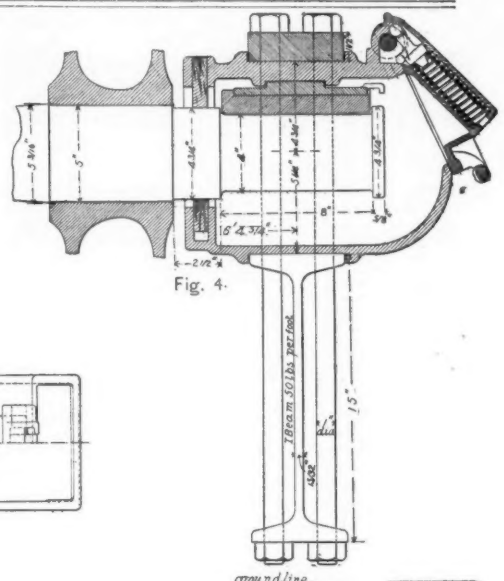


Fig. 4.

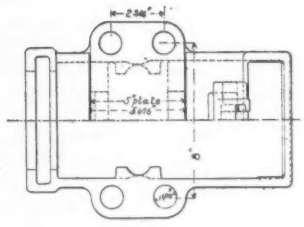


Fig. 5.

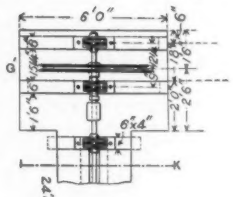
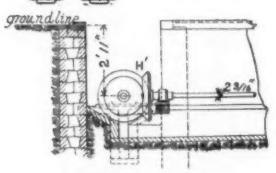
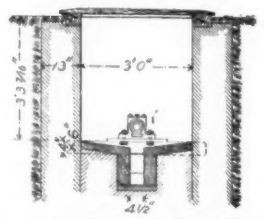


Fig. 12.



Section through R S.
Fig. 13.



Section through I K and L M.
Fig. 14.

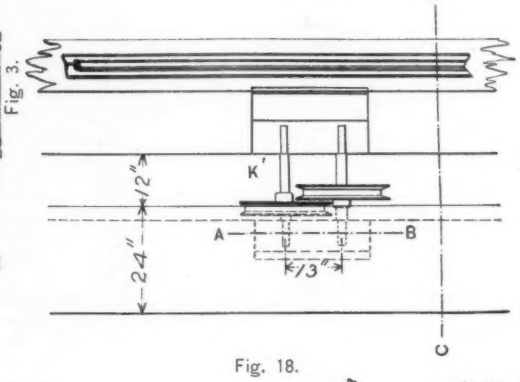
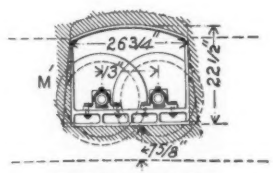
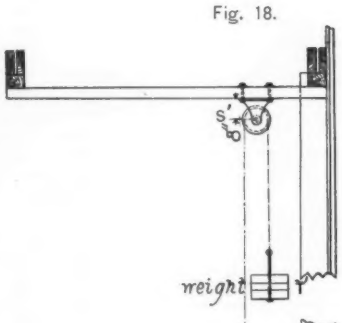
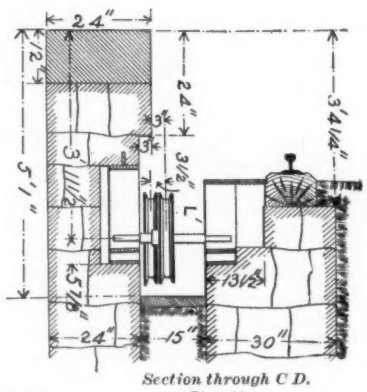


Fig. 18.



Section through A B.
Fig. 20.





Section through C D.
Fig. 19.

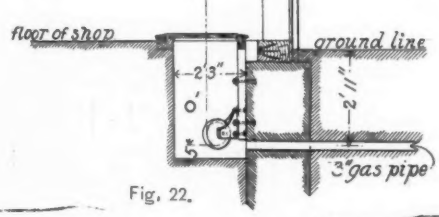


Fig. 22.

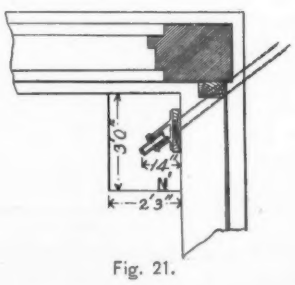
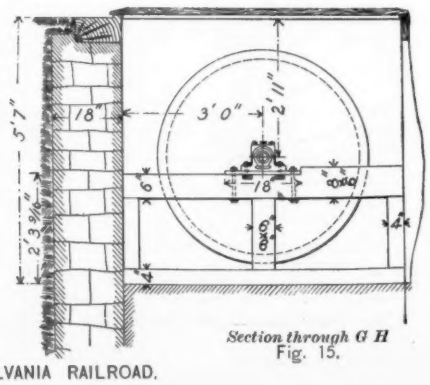


Fig. 21.



Section through G H
Fig. 15.

TRANSFER TABLES WORKED BY FLYING ROPE AND BY ELECTRIC MOTOR—PENNSYLVANIA RAILROAD.

Fig. 6.

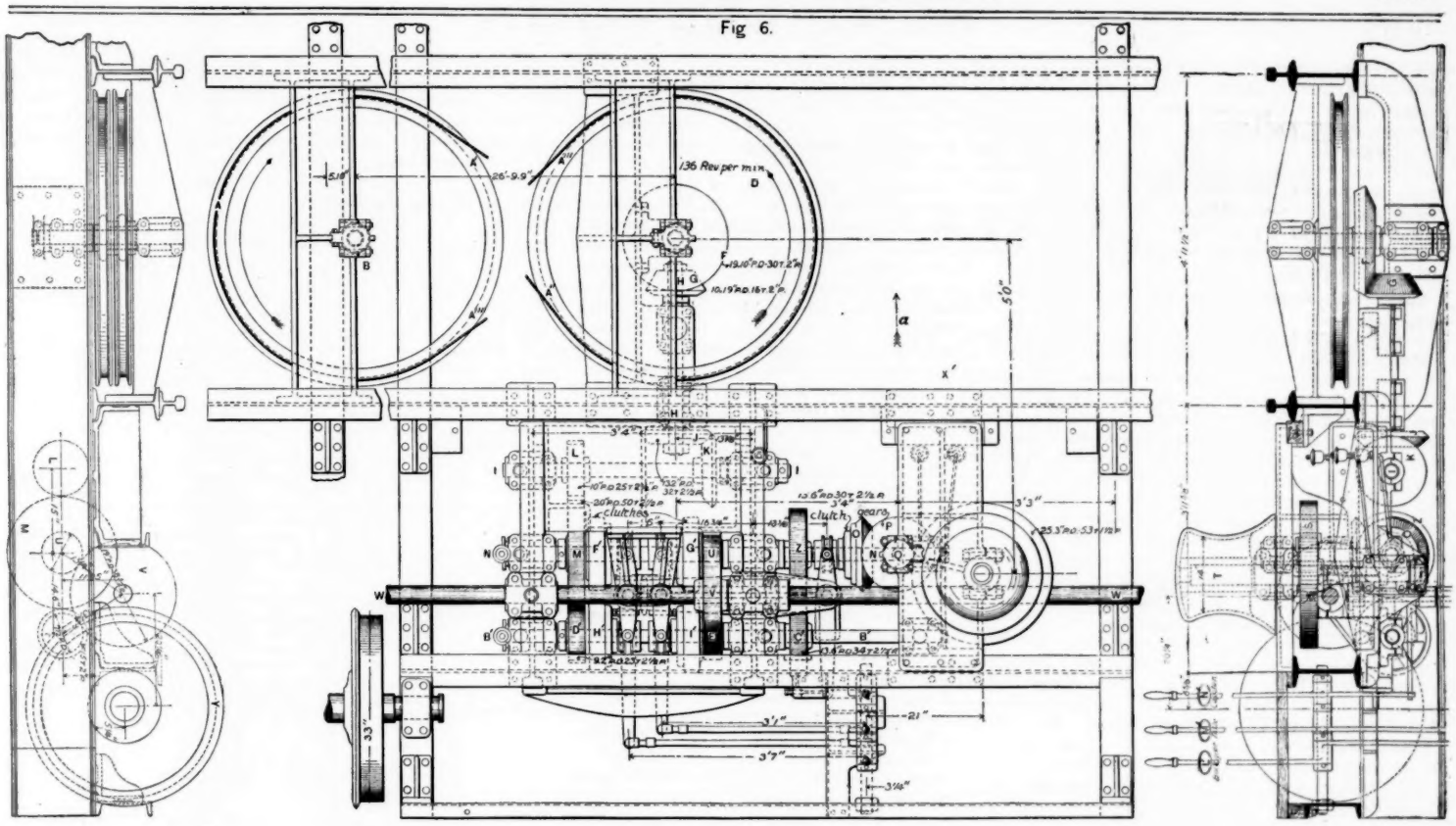


Fig. 8.

Fig. 9.

Fig. 7.

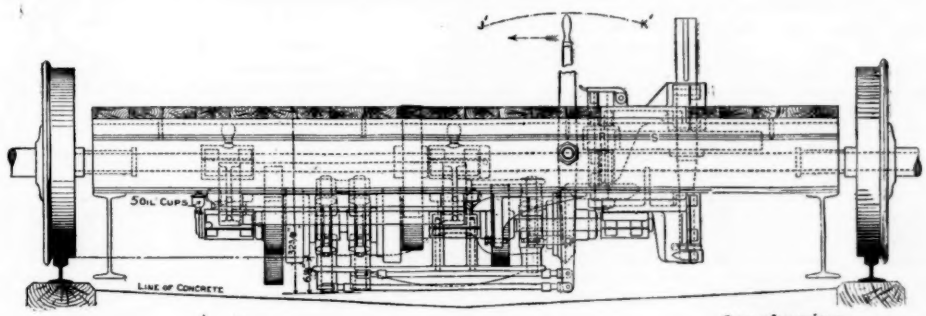


Fig. 10.

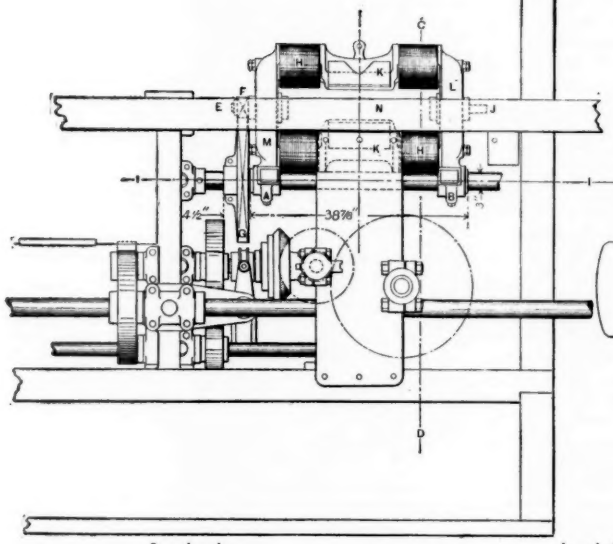


Fig. 11

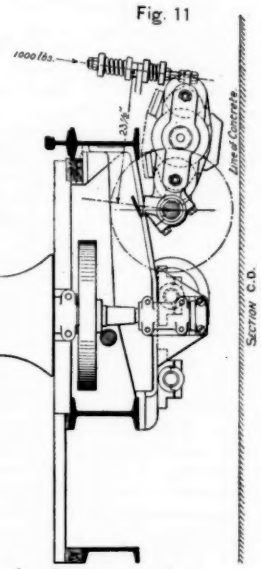


Fig. 12.

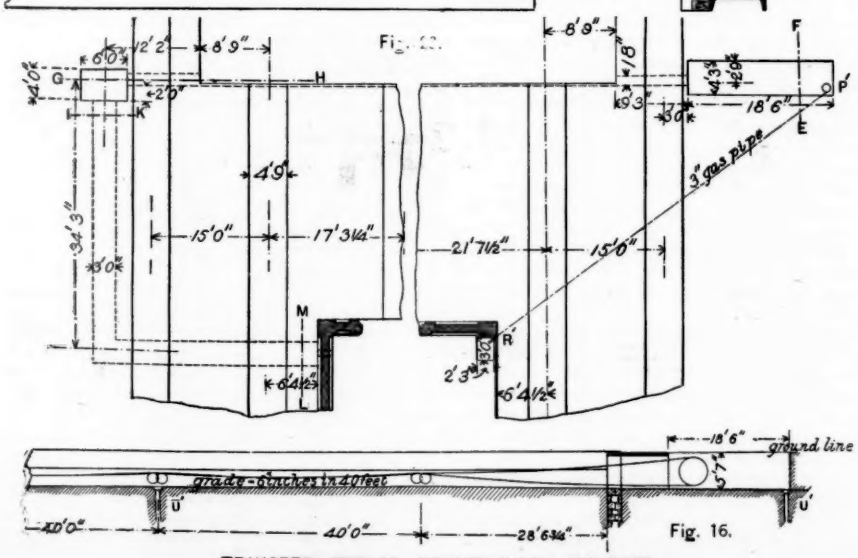
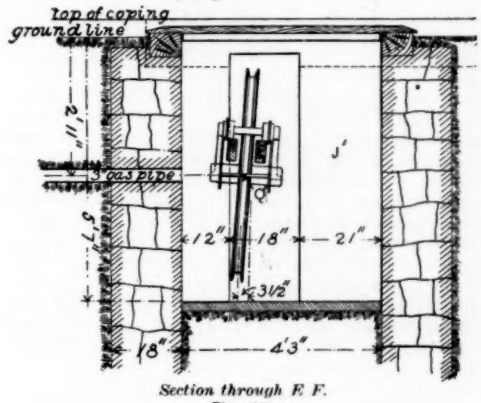


Fig. 16.

TRANSFER TABLES—PENNSYLVANIA RAILROAD.



Section through E F.
Fig. 17.

that the shaft *I I* will revolve $\frac{30}{16}$ times as fast as the wheel *D*, or at 255 revolutions; the velocity of the wheel *D* being about 136 revolutions per minute (according to the direction in which the table is moving), and the number of teeth in the gears *F* and *G* being 30 and 16 respectively. It is evident, of course, that when the table travels with the wire rope in general, the speed of the driving gear will be less than when the table is traveling against the direction of the rope, because the contra-motion of the table raises the velocity of the rope with reference to the table.

The shaft *I I* is the main driving shaft of the mechanism on the table and revolves in the same direction at all time. Upon the shaft *I I* is mounted a pinion *L*, which drives a spur gear *M*, carried upon a horizontal shaft *N N*. The spur gear *M* has twice as many teeth as the pinion *L*; therefore, the shaft *N N* will revolve 127½ times per minute. Upon this shaft *N N* is placed a bevel gear *O*, which drives another bevel gear *P*, mounted upon a vertical axis *Q*. Upon *Q* is placed a pinion *R* which drives a spur gear *S* upon the vertical shaft of the capstan *T*. The bevel gears *O P* having the same dimensions, and the pinion *R* having about 0.22 + as many teeth as the spur gear *S*, it follows that the capstan *T* will revolve about 28 times per minute. The foregoing describes the method by which the capstan is driven in one direction; this is the direction when its speed is the slower of the two variations in speed. The following shows how it is driven in the other direction, which is the direction of the faster speed. To change the direction of the movement of the rope it is only necessary to start it on the other side of the capstan The spur gear *M*, upon the shaft *N N*, drives a pinion *D'* upon the shaft *B' B'*. *D'* has $\frac{33}{88}$ as many teeth as *M*, therefore the shaft *B' B'* will

revolve 277 times per minute. Upon the same shaft as D' is placed a pinion C', which will drive the spur gear Z, and thereby the shaft $N\,N$, when the clutch F' is disconnected from the gear M. The ratio of the number of teeth in C' and Z is $\frac{34}{34}$ therefore the shaft $N\,N$, when driven in this way, will revolve 241 times per minute. When the gears are connected in this manner the capstan has a circumferential speed of about 200 ft. per minute, or nearly twice as great as when driven directly from M without the aid of the back gears $D'\,C'$.

The driving mechanism of the table along the pit is arranged as follows:

Upon the shaft $N\,N$ is mounted a pinion U, which drives a spur gear V on the shaft $W\,W$. Upon the shaft $B'\,B'$ is placed a pinion E', having the same dimensions as the pinion U, and driving the same spur gear V. The shaft $W\,W$ extends the whole length of the table. Upon it is mounted, at each end, a pinion which drives the spur gear Y, mounted upon the carrying axles of the tables. The object of driving the table at both ends is to insure the parallelism of the various positions of the table in the pit. If one end of the table should happen to move faster than the other by reason of greater retardation at one end, as might be the case unless this precaution were taken, it would be a difficult matter to readjust the table to a rectangular position. For this reason also the driving power is located as the centre of the table in order to equalize the twisting of the shaft.

We have found in the preceding that the shaft $N\,N$ revolves 127½ times per minute; therefore, when the shaft is connected to $W\,W$ by means of the clutch F' and G', and the gears U and V, the shaft W will revolve $\frac{12}{34}$ times as fast as $N\,N$, or about 50 revolutions per minute. The ratio of the number of teeth in U to those in V is $\frac{12}{34}$—it is the same as the ratio of the number of teeth in E' to those in V. The ratio of the number of teeth in the pinion on the shaft W to the number of teeth in the large spur gear Y is about 1 to 4¼; therefore, the revolution of the carrying wheels of the table when connected in this manner will be about 12 per minute. This number of revolutions will cause the table to move along the pit at a speed of about 105 ft. per minute. When the shaft $W\,W$ is driven by U, same as before, but the power being carried around through the shaft $B'\,B'$, and, therefore, through the gears M, D', C', Z, U, the velocity of the table is increased to about 200 ft. per minute, in the same direction as before. This is evident because the shaft $B'\,B'$ revolves, when connected to M by D', much faster than the shaft $N\,N$ when connected to M by the clutch F'. And, therefore, when $B'\,B'$ is connected to $N\,N$ by means of C' and Z, it will drive the shaft $N\,N$ nearly as fast as itself, because the gears C' and Z have nearly the same number of teeth. The reverse motion of the table, at about the same speed as above, is accomplished as follows: The clutch F' being disconnected, the gear M drives D', the shaft $B'\,B'$, and the gear E', and therefore the shaft $W\,W$ at the higher rate of speed in the opposite direction to that in which the table moves when $W\,W$ is driven by U. The slower motion is produced by engaging the clutch F' and driving the shaft $W\,W$ by the shaft $N\,N$, the spur gear Z, the spur gear C' and the pinion E'. The clutch G' at this time being disengaged. In general, the operation of this gear may be stated as follows: When the shaft $W\,W$ is driven by E' it will move in one direction, and when driven by U will move in the other. When E' is driven by D', or when U is driven by D', the speed of the table will be nearly twice as fast as when U is driven by M, or E' by M, through Z and C'. The clutches F' and H' are connected to the same "shifter" on opposite sides of the axial point. The same is true of I' and G'; therefore, when H' is thrown in, F' is thrown out, and vice versa, and when I' is thrown in, G' is thrown out, and vice versa.

Actual speeds of table in feet per minute:

Table traveling with the rope, slow speed, 107 ft. per minute; fast, 192 ft. per minute.

Table traveling against the direction of rope, slow speed, 104 ft. per minute; fast speed, 209 ft. per minute.

Circumferential speed of capstan at centre of height, slow speed, 106 ft. per minute; fast speed, 200 ft. per minute.

Velocity of wire rope, 1,800 ft. per minute.

The various motions of the table and capstan are produced by operating the clutches by means of the levers L', M' and N', either in the direction of J' or K' from the central position, as may be required to produce the desired motion. The movements of these levers to produce the various motions of the table are as follows. When the lever M' is moved in the direction of J', the clutch I' is engaged with the pinion E'. At this time, the lever L' being moved in the direction of K', the clutch H' is engaged with D' and the table is moved by means of E', at its fastest speed, in the direction of the arrow a, shown in fig. 4. If, now, with the lever M' in the same position, the lever L' be moved in the direction of J', the clutch F' will be engaged with the gear M and E', and therefore the table will be driven through Z and C' in the same direction as before, but at a slower speed. To move the table in the opposite direction the lever M' is moved in the direction of K', which connects the clutch G' with the pinion U, which, as before explained, reverses the motion of the table. If, at this time, the lever L' be thrown toward J' so as to engage the clutch F' with the gear M, the table will move at the slower speed in the direction opposite to the arrow. And if the lever L' be moved toward K', thereby engaging the clutch H' with the pinion D', the table will be driven through C', Z and U in a direction opposite the arrow at its faster speed. The manipulation of the lever N' engages, or disengages, the clutch which connects the shaft $N\,N$ with the bevel gear O, which drives the capstan. When the clutch connected to N' is engaged with the bevel gear O, a movement of the lever L' in the direction of J' throws in the clutch F', and the capstan is driven at its slower speed. If a lever L' be moved toward K', the clutch H' is engaged with the pinion D', and the capstan is driven at its faster speed.

Recently at the Altoona shops a table of this description has been arranged by the Yale & Towne Manufacturing Co. and the Sprague Electric Motor Co., to be operated by electricity. The mechanical arrangements of the framing of the table and all the parts except the driving gear were designed by the mechanical department of the Pennsylvania road, at Altoona. Fig. 10 and 11 show the arrangements for attaching the electric motor to the driving gear. This arrangement may be described as follows: In the place of the wire rope pulleys B and D and the bevel gears F, G, J and K, is mounted an electric motor at X', fig. 7, as shown in fig. 10, and the shaft $I\,I$ is extended to pass through its bearings A and B, fig. 10. The armature of the motor is placed at N, its shaft $J\,E$ extending through the side frames $L\,M$. $H\,H$ are the field magnets, and K and K the pole pieces. Upon the armature shaft $J\,E$ is mounted a small pinion F, which drives a spur gear G, mounted upon the shaft $I\,I$, and thus performs the functions of the wire rope and pulleys. The connections from the shaft $I\,I$ to the capstan and the tables are precisely the same as those we have described for the wire rope transmission, and the various speeds and direction of movement can be regulated in the same way. The speed and power can also be regulated by means of an electric switch on the table. This switch connects various sections of the field coils of the motor, thus varying the amount of magnetism in the pole pieces $K\,K$, which variation in magnetic intensity changes not only the power but the speed of the armature shaft; this method of regulating the power of the motor obviates the use of any electrical resistance which absorbs power. The current of the motor is collected by a trolley from a copper conductor placed underneath a wooden stringer in the pit, the wooden stringers affording protection to the conductor. This stringer runs longitudinally the whole length of the pit.

This electric motor is about a ten horse-power motor in size, and the power propelling it is derived from a dynamo about 600 ft. distant. The weight of this motor is about 900 lbs. With the electrical attachment the maximum speed of the table can be regulated from 100 to 300 ft. per minute, according to the loading. It will be noticed that the motor is suspended by springs on the end distant from the shaft $I\,I$. The object of this spring attachment is to allow the armature to rotate slightly, probably about $\frac{1}{10}$ of a revolution, before the table starts. This arrangement is used on nearly all street car motors, and enables a small motor to start a heavy car. The table at Altoona, to which the electric motor is attached, is 60 ft. long and 17 ft. wide, traversing a distance of 295 ft. The potential of the current used is 500 volts at the dynamo, which is decreased by various resistances to about 480 volts at the motor. A table of this type is now being built by the Sprague Electric Railway & Motor Co. for the Philadelphia & Reading R. R., the main structure for which is being supplied by Chadbourne & Hazleton, of Philadelphia.

The details of the mechanism which transmits the power to the wire rope and the method of supporting the rope, as well as the devices for maintaining the required tension, and the drainage of the pit, are important features of a successful adaption of the wire rope transmission to transfer tables. And the admirable manner in which these details are arranged is worthy of attention, and we have, therefore, shown them in figs. 12 to 18. The following is a description of the arrangement: At C', fig. 12, is shown the end of the shaft D' inside of the adjacent blacksmith shop, upon which is mounted a pulley with a 9 in. face. This pulley is driven from the shaft within the building. From this point C' a shaft D' extends out from the wall of the building to the point E', where there is a pair of bevel gears which transmit the power from the shaft D' to the shaft F' at right angles to D'. This shaft extends to the point G', where it drives a wire rope pulley, as shown. The shafts D' and F' are supported by bearings at various points, the centre of bearings being about 8 ft. apart. A detail of the pit at E', showing the bevel gears, is given in fig. 13 at H'. A section through the pit adjacent to one of the bearings of the shaft F' is shown in fig. 14 at I'. The system of drainage of the shaft pit is clearly shown in this figure. The details of the mountings of the pillow blocks for the wire rope pulley at G', fig. 12, are shown in fig. 15. Fig. 16 illustrates the system of carrying the wire rope from one end of the pit to the other. The wire rope is continuous from end to end, and runs over the large pulley shown at G', fig. 12, at one end and another large pulley shown at J', fig. 17, at the other end of the pit. This pulley J' slides longitudinally on bars arranged for that purpose. Between the pulleys G' and J' the rope is carried on smaller pulleys placed close together laterally and about 40 ft. centres longitudinally with the pit, as shown in fig. 16. The details of the mounting of these pulleys are shown in fig. 18 at K', fig. 19 at L' and fig. 20 at M'.

The arrangement for taking up the slack of the cable by allowing the wire rope wheel J', fig. 17, to slide longitudinally in the pit is shown in figs. 17, 21, 22 and 23 at J', N', O' and P' respectively. The connection for producing the required tension is made as follows: To the frame of the sliding pulley J' shown in fig. 17, the wire rope is attached at Q', which passes a short distance longitudinally with the pit, around a carrier, shown at F', fig. 23, thence diagonally to the corner of the erecting shops, as shown at R', fig. 23, and in detail at N', fig. 21. From P' to R', fig. 23, the wire rope passes through a 3-inch gas pipe buried in the earth. From R' the tension rope passes vertically as shown at O', fig. 22, to the carrier attached to the floor-beams of the erecting shop, as shown at S', around this carrier down to the counterbalance T', the weight of which is adjusted to suit. The arrangement for draining the pit, longitudinally, is shown at $U'\,U'$, fig. 16.

The completeness of the illustrations renders further description unnecessary.

New England Railroad Club.

The annual meeting of the club was held at the Revere House, Boston, March 13, and was made the occasion of festivity by the members of the club, and many invited guests, a considerable number of whom were ladies. An informal reception was held in the parlors from five to six o'clock for social conversation, after which a short business meeting took place for the presentation of the annual report and the election of officers, Mr. George Richards, the Vice-President, occupying the chair in the absence of President Lauder.

Mr. Francis M. Curtis offered the report of the Secretary and Treasurer, from which it appears that the club now numbers 196 members.

The Committee previously appointed to nominate officers for the ensuing year reported the following list: For President, George Richards; Vice-President, Orland Stewart; Secretary and Treasurer, Francis M. Curtis; Executive Committee, George Richards (Chairman), James N. Lauder, J. W. Marden, Osgood Bradley, Robert Johnson, F. D Adams, Samuel D. Nye, Albert Griggs, F. M. Twombly; Finance Committee, Charles W. Sherburne (Chairman), James Smith, Carroll J. Post, Joel H. Hills, Daniel S. Page, Isaac N. Keith, Charles Richardson, A. G. Barber, John Kent. By vote the report was declared accepted, and the gentlemen named elected as officers for the next year.

President Richards announced as the subject for discussion at the next meeting "Compound Engines," to be opened by Mr. Angus Sinclair, of New York.

The company then proceeded to the large dining room, which was well filled, and an elegant and very satisfactory repast was enjoyed, after which the president called the assembly to order and introduced the Hon. George G. Crocker, Chairman of the Massachusetts Board of Railroad Commissioners, who said, I should have no hesitation in speaking here to-night were I entirely surrounded by gentlemen, because we all know what each other knows, and what the others do not know; but when we are called to get up here in the presence of ladies, ladies who, from some personal experience of my own, I am inclined to think regard railroad men as of a peculiar character, men rather above the ordinary grade of men, the case is quite different. And you are right about it, ladies! When your husbands come home at night and look solemn and wise, it is because they are solemn and wise, and it is because they have had great problems on their minds during the day, the greatest problem being to discover the way in which they can bring the community as near as possible to destruction and still avoid it; and they are solemn when they come home at night because they know that if they spend any time at home and sleep during the night, some other railroad man will get ahead of them.

Now one word in regard to something that the Board of Railroad Commissioners have been devoting themselves to recently, and that is the question of automatic couplers. I am not prepared here to-night to display any invention of my own; but at a meeting of the Railroad Commissioners of the various states, held by invitation of the Inter-state Commerce Commission, the Massachusetts Board brought up for the consideration of the convention the subject of automatic couplers, and urged the consideration of that subject upon the attention of the Inter-state Commerce Commission, and a vote was unanimously passed requesting them to take the matter into consideration, with a view to making some recommendation to the railroads on the matter, or, if necessary, to secure some legislation by Congress upon the subject. Our Board feels very strongly upon that subject, that there ought not to be 150 employés per year maimed in Massachusetts. We believe that that number can be very materially decreased. We believe, too, that with active, energetic efforts we can bring about the result a great deal quicker than if we wait for somebody else to take the initiative; and I desire to say to you here, gentlemen, that if there is any way you know of in which our Board can assist in expediting that work, we desire you to call upon us and inform us at once.

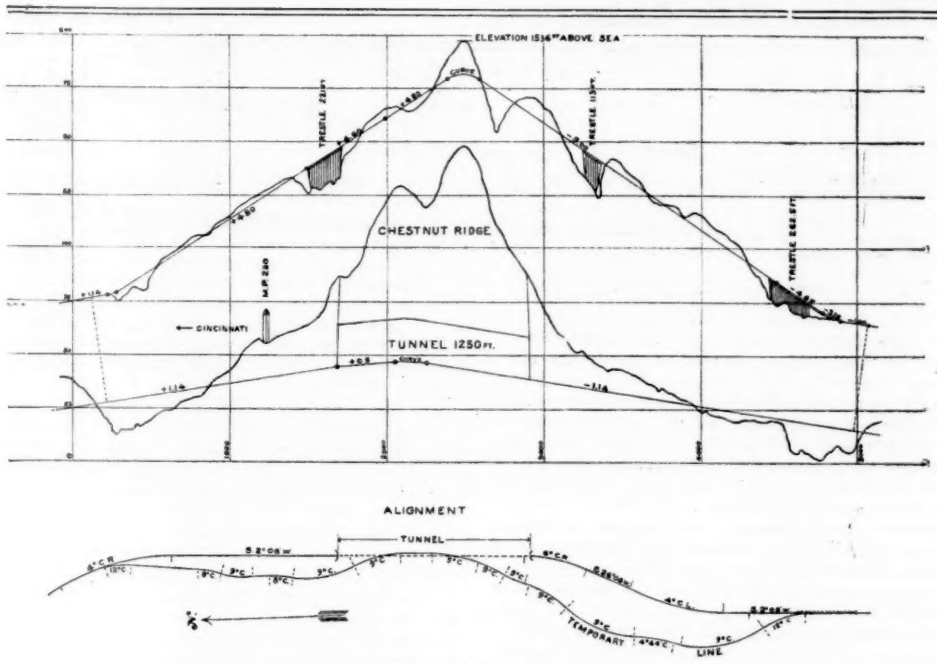
The matter of train brakes on freight cars is another matter, which, it seems to us, ought to be pushed; and we believe that through the instrumentality of this organization a great deal can be done to secure the rapid in roduction of train brakes on freight cars, and thereby prevent so many men being killed every year by falling from the tops of cars. One-half of all the injuries to employés on railroads last year in the state of Massachusetts were in coupling and uncoupling cars, and about one-third of all the fatal accidents to employés were in falling from the tops of freight cars. Your association is one which can help to bring about that result.

Now, ladies, I am very glad that you are here to-night and I hope that once in a while you will ask your husband, when they come home what they have done to prevent accidents to brakemen in coupling and uncoupling cars or in setting the brakes thereof, and if you ask often enough, by the time you come to the next annual dinner of this association, there will be a very decided advance in that respect.

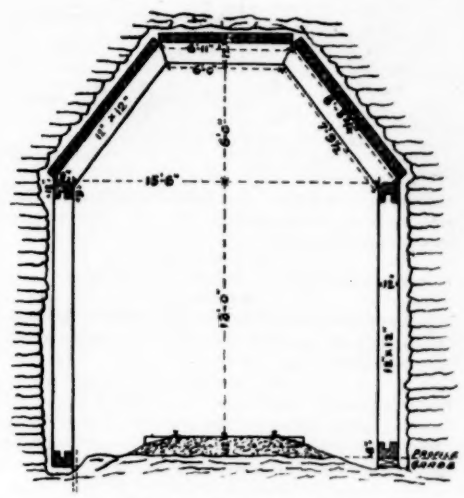
I have just one nut to crack with some of the gentlemen here. I have not been long a member of the Board of Railroad Commissioners, but I must confess that during my short experience I have been impressed with the belief that some of the gentlemen here, when they have a visit from a man with an invention, and they cannot get rid of him in any other way, send him up to the Board of Railroad Commissioners. Now, I would like to hear from some of the railroad men a confession of their sins in that respect, and I am prepared to make one myself. I must confess that I have sometimes done the same thing, and sent them back.

Other speakers were ex-Governor Smyth, of New Hampshire; Mr. William Martin, of the Martin Car Heater; Mr. Bolen, of Newark, N. J.; Mr. W. C. Tyler, of the *Railway Review*, and Mr. George H. Coney.

The latter spoke briefly of Capt. Ericsson. He said: Capt. Ericsson was the father of the submerged propeller; the earliest propellers built in this country were designed by Capt. Ericsson, and I think were placed on the Delaware & Raritan Canal. The first Ericsson propeller built in New England was built by Otis Tufts, at East Boston, and put upon a steamer called the "R. B. Forbes." That was a twin screw, and that was a propeller where the blades, instead of being attached to the hub as they are now, were attached to the rim that went round them. Previous to this my father made a contract to build an iron cutter for the United States Revenue service, called the "McLane." There were six ordered built, and this was one of them. Three of them had the Hunter propeller and three the Ericsson propeller. The first constructed with the Hunter propeller was the "Spencer," built in New York; the "Legaree," with the Ericsson propeller, was also built in New York. Those two vessels were the first to demonstrate the relative value of the Hunter propeller and the Ericsson



Plan and Profiles.



Section, Tunnel No 17.

BURNED TUNNEL AND TEMPORARY LINE, CINCINNATI SOUTHERN RAILWAY.

propeller. The "Spencer" could not go fast enough to get out of her own way; the "Legaree" made very good time on the trial test. Mr. B. F. Isherwood wrote a book about 30 years ago called "Engineering Precedents," and he based all his opinions and calculations upon the trials of these two steamers. The Hunter propellers were all abandoned, and my father changed the "McLane" to a side wheel steamer. His name was Jabez Coney. He also built the U. S. Steamer "Saranac."

Captain Ericsson was a man who worked and practiced nearer to theory as regards strength of material than any other engineer of the present day; and it has often been said that the steamer "City of New York," which used to run from Boston to New York, had her engines constructed nearer to theory than any others ever constructed and they never broke down, they were so perfect in their proportions.

The Cincinnati Southern Tunnel Fire.

The tunnel collision on the Cincinnati Southern, which resulted in the destruction of the timber lining of the tunnel and made it necessary to build a temporary line over the ridge, has been mentioned before in these columns. We are now able to give details of the matter hitherto unpublished, together with a section and profiles of the tunnel and temporary line.

Tunnel No. 17 is one of the 27 tunnels on the line of the Cincinnati Southern. It is 230 miles south of Cincinnati, in the State of Tennessee, and penetrates Chestnut Ridge, an unimportant spur of the Cumberland Mountains. The tunnel was completed May, 1876. Its length is 1,250 ft., of which 1,103 ft. was timbered as shown in the accompanying cross-section, while the remaining 147 ft. had side lagging in addition. The old timbering had been repaired within the last two or three years, so that the tunnel was in good condition. The total quantity of timber lining amounted to about 450,000 ft. B. M.

At 7 o'clock of the evening of Feb. 16, a rear collision of two south-bound freight trains occurred about the centre of the tunnel. The engine of the rear train wrecked the forward caboose and set fire to it. All the trainmen escaped without injury, but one engine, the tender and five or six cars were lodged in the tunnel. One of the cars was loaded with coal. The fire spread rapidly and before means for extinguishing it could be procured, it was beyond control.

The road forces succeeded in cutting a gap in the lining, 100 ft. from the south end. With the exception of this 100 ft. the entire timbering of the tunnel was burned within six days. The smoke issued from each portal in such volumes that no approach could be made by workmen, to build bulkheads with the view of closing the mouths of the tunnel in order to extinguish the fire. There having been recent heavy rains, surface water was pouring over the portals quite copiously. Dams were hastily constructed by casting earth from the top of cuts, to partially flood the tunnel with the hope of saving the track and engine and to extinguish the carload of coal. It would have been useless with such hastily constructed dams to expect to flood the tunnel to the roof. When a depth of 2 ft. of water at the north end and 8 ft. at the south end had been impounded, a sudden freeze put an end to the supply.

It became evident shortly after the occurrence of the fire, that whatever was to be done to the tunnel to re-open it, the traffic of the road would be interrupted for a longer period than could be tolerated. The energies of the company's forces were, therefore, diverted from the tunnel to the construction of a temporary track over Chestnut Ridge. A line was rapidly run, and on the second day after the commencement of the fire grading began. The grading was completed and track laid in six and one-half days.

The temporary track lacks a few feet of being one mile long. The diagrams of the profile and alignment explain themselves. Solid rock was blasted for a depth of 10 ft. in the summit cut and was encountered in the bottoms of most of the other cuts. The three trestles indicated were built for the reason that they could be more rapidly constructed than embankments.

It will be seen that the temporary line has 9 degree curves and 5 per cent. grades. To build a better line meant a delay of a month or more in the resumption of traffic. The track was immediately put in good surface and ballasted with cinders, which being done, no difficulty was experienced in passing all trains. Trains are divided in two parts, and each section of freight train is taken over by four engines, three being headers and one pusher.

A contract was made, by the time the temporary track was finished, for arching the tunnel with masonry. The tunnel was excavated in shale and sandstone, and the burning of the timber caused a quantity of packing and disintegrated shale to fall on the track, covering it for a depth of 4 ft. A 6 in. vein of coal is found at the south end, but on account of the considerable dip of the strata disappears below grade, about 400 ft. inside the tunnel. The work of clearing the fallen material is now in progress, preparatory to arching.

Transition Curves.*

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FROM THE GERMAN, BY E. A. GIESELER.

III.

6. THE INTRODUCTION OF TRANSITION CURVES INTO EXISTING TRACK.

When a transition curve is to be inserted into an existing curve of radius R, the connection between the first and the latter is best made by the introduction between them of an intermediate circular curve, the radius r of which is slightly smaller than R. The longer the portion of existing curve thus modified, the smaller the required difference between r and R. Now, if the central angle of the intermediate circular curve is designated by α (fig. 3), and if $A\ B$ represents the transition curve, $B\ C$ the intermediate circular curve, and D the tangent point of the existing circular curve as well as the commencement of co-ordinates, we have for the abscissa of the point C, in which the intermediate curve joins the existing one:

(25) $$D\ E = b = R \sin \alpha$$

and for the ordinate of the same point.

(26) $$E\ C = n = R\ (1 - \cos \alpha)$$

The co-ordinates of the lowest point of the intermediate circular curve are as follows:

(27) $$D\ G = g = J\ O_2 = (R - r) \sin \alpha$$

and

$$G\ F = m = D\ O_1 - F\ O_2 - J\ O_1$$
$$= R - r - (R - r) \cos \alpha$$

or:

(28) $$m = (R - r)\ (1 - \cos \alpha)$$

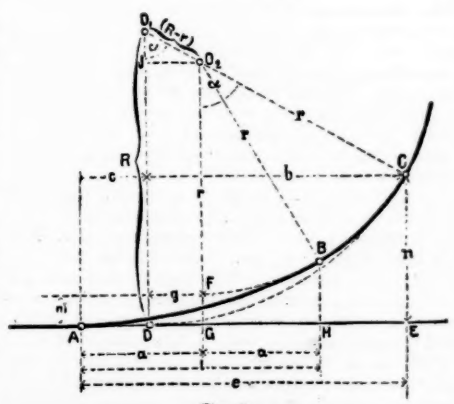


Fig. 3.

This ordinate is the same, the value of which is given by equation (17), and in combination with (11) we now obtain (r taking the place of R in those equations):

(29) $$m = \frac{l^2}{24\ r} = \frac{P^2}{24\ r^3}$$

consequently,

(30) $$(R - r)\ (1 \cos \alpha) = \frac{P^2}{24\ r^3}$$

In order to eliminate the inconvenient angle α, we obtain from (25) and (30)

(31) $$\sin \alpha = \frac{b}{R}$$

and

(32) $$\cos \alpha = \frac{P^2}{24\ r^3\ (R - r)}$$

Squaring and adding these two equations renders:

$$\sin^2 \alpha + \cos^2 \alpha = 1 = \frac{b^2}{R^2} + 1 - \frac{P^2}{12\ r^3\ (R - r)} + \frac{P^4}{576\ r^6\ (R - r)^2}$$

whence we derive

(33) $$\mathbf{b = \frac{R\ P\ \sqrt{48\ r^3\ (R - r) - P^2}}{24\ r^3\ (R - r)}}$$

In order to compute b from this formula it remains to adopt a value for $(R - r)$, or to fix the degree of the intermediate curve. In the appended tables No. 3 and No. 4, which are those for curves of long radii, the degree of the intermediate curve has been assumed 20′ larger than the degree of the existing curve for all curves from 7° 00′ to 5° 00′. Thence to 1° 00′ the difference between the degrees of the two curves gradually declines to 4′.

In tables No. 5 and No. 6, which are those for curves of shorter radii, the difference between the degrees of intermediate and existing curve gradually declines from 50′ to 20′.

In the first-named two tables the values for P have been assumed as before, while in the last-named ones P has been assumed uniformly at 68 r, in order to reduce the required length of transition curve, in accordance with reasons mentioned before.

For the introduction of the transition curve the knowledge is still required of the value

$$A\ D = c = a - g.$$

Substituting according to equations (15) and (11)

$$a = \frac{P}{2\ r}$$

and again, according to equations (27) and (31)

$$g = \frac{(R - r)\ b}{R}$$

we find

(34) $$\mathbf{c = \frac{P}{2\ r} - \frac{(R - r)\ b}{R}}$$

If now A, the point at which the transition curve commences, is looked upon as the commencement of co-ordinates, then we have for the abscissa of C:

(35) $$\mathbf{A\ E = e = b + c,}$$

and for the ordinate of the same point we find from (26) and (30)

(36) $$\mathbf{E\ C = n = \frac{R}{R - r}\ \frac{P^2}{24\ r^3}}$$

According to the equations 11, 12, 17, 33, 34, 35 and 36 the values of l, k, m, b, c, e and n have been computed and are rendered in table No. 3 for the curves with larger radii, and in table No. 5 for those with smaller radii, while in tables No. 4 and No. 6 the co-ordinates of intermediate points on transition curve are given.

By the use of these tables the introduction of transition curves into existing track is very simple, the way of proceeding being as follows:

Say, for instance, a transition curve is to be introduced into a 5° curve. Then we take from table No. 3:

$$c = 51.48 \text{ ft.,}$$

which length is measured backwards on the tangent from the

* The above article will be published with appended tables by the Brandis Manufacturing Co., 55 Fulton street, New York. The preceding parts of this paper appeared in the *Railroad Gazette* of Jan. 4 and Feb. 8.

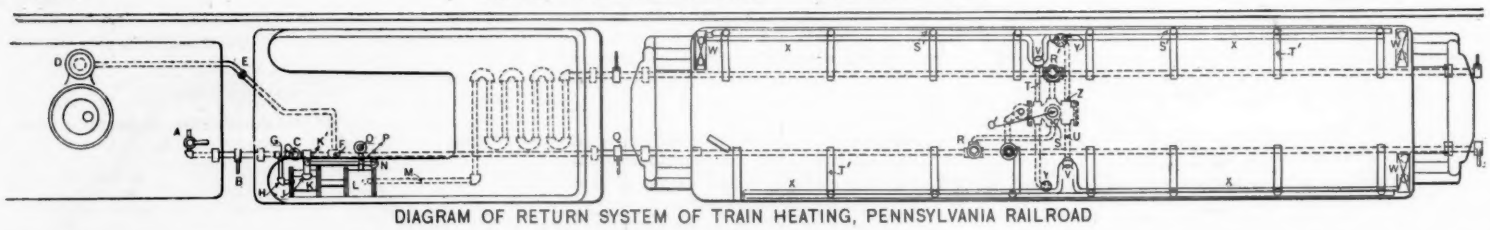


DIAGRAM OF RETURN SYSTEM OF TRAIN HEATING, PENNSYLVANIA RAILROAD

existing tangent point. The point A thus found is the commencing point of the transition curve, and measuring from it forward on the tangent,

$$l = 120.97 \text{ ft.},$$

we arrive at the point H, whence an offset of

$$k = 2.27 \text{ ft.}$$

brings us to the point B, the terminal point of the transition curve. In order to locate the latter in its entire extent, we take from table 4 the ordinates

0 01, 0.08, 0.28, 0.66, 1.28, 2.27,

which respectively correspond to abscissas of 20, 40, 60, 80, 100 and 120 ft. measured from A forward.

The terminal point of the intermediate curve can either be located by means of its co-ordinates

$$e = 195.49 \text{ ft. and } n = 9.08 \text{ ft.},$$

or by means of laying off the length of such intermediate curve $L = 74.83$ ft.

In case additional points are wanted on the intermediate curve F is located by means of $m = 0.57$ ft.

Then the instrument is mounted on F, and by means of the degree of the intermediate curve, 5° 20′, any number of additional points on it may be located in the usual manner.

In table No. 5 the length L is not given, because there it is practically equal to $e - l$.

Inserting transition curves into existing curves of large radii.

TABLE NO. 3.

Degree of Existing curve.	Degree of Intermediate curve.	m	c feet.	e feet.	n feet.	l feet.	k feet.	L feet.
7° 00′	7° 20′	1.47	72.78	301.06	32.46	166 27	5.89	137.29
6° 45′	7° 05′	1.33	70.10	287.34	28.25	160.61	5.31	128.73
6° 30′	6° 50′	1.19	67.43	273 74	24.47	154.95	4.77	120.36
6° 15′	6° 35′	1.07	64.76	260.27	21.08	149.29	4.27	112.21
6° 00′	6° 20′	0.95	62.09	246.96	18.05	143.63	3.80	104.28
5° 45′	6° 05′	0.84	59.43	233.82	15.37	137.96	3.37	96.59
5° 30′	5° 50′	0.74	56.78	220.86	13.00	132.30	2.97	89.12
5° 15′	5° 35′	0.65	54.14	208.09	10.91	126 63	2.60	81.88
5° 00′	5° 20′	0.57	51.48	195.49	9.08	120.97	2.27	74.83
4° 45′	5° 04′	0.49	48.91	185.76	7.79	114.92	1.95	71.08
4° 30′	4° 48′	0.41	46.34	176.03	6.62	108.88	1.65	67.34
4° 15′	4° 32′	0.35	43.77	166.29	5.58	102.83	1.39	63.60
4° 00′	4° 16′	0.29	41.18	156.52	4.65	96.79	1.16	59.83
3° 45′	4° 00′	0 24	38.61	146.77	3.83	90.74	0.96	56.10
3° 30′	3° 44′	0.20	36.04	137.01	3.12	84.69	0.78	52.37
3° 15′	3° 28′	0.15	33.46	127.23	2.50	78.64	0.62	48.63
3° 00′	3° 12′	0.12	30.89	117.45	1.96	72.60	0.49	44.88
2° 45′	2° 56′	0.10	28.93	110.03	1.58	68.00	0.39	42.05
2° 30′	2° 40′	0.09	28.93	110.03	1.43	68.00	0.36	42.04
2° 15′	2° 24′	0.08	28.93	110 03	1.29	68.00	0.32	42.03
2° 40′	2° 08′	0.07	28.93	110.03	1.15	68.00	0.29	42.03
1° 45′	1° 52′	0.06	28.93	110.03	1.00	68.00	0.25	42.03
1° 30′	1° 36′	0.05	28.93	110.03	0.86	68.00	0.22	42.03
1° 15′	1° 20′	0.04	28.93	110.03	0.72	68.00	0.18	42.03
1° 00′	1° 04′	0.03	28.93	110.03	0.57	68.00	0.14	43.03

For the explanation of the terms m, c, e, n, l, and k, see fig. 3. L = length of intermediate curve, $k = B H$.

TABLE NO. 4.

Co-ordinates of intermediate points on transition curve.

Abscissas.	Ordinates from 7° 00′ to 3° 00′.	Ordinates, 2° 45′.	Ordinates, 2° 30′.	Ordinates, 2° 15′.	Ordinates, 2° 00′.	Ordinates, 1° 45′.	Ordinates, 1° 30′.	Ordinates, 1° 15′.	Ordinates, 1° 00′.
20.....	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00
40.....	0.08	0.08	0.07	0.07	0.06	0.05	0.04	0.04	0.03
60.....	0.28	0.27	0.25	0.22	0.20	0.17	0.15	0.12	0.10
80.....	0.66	.....	.....	.....	.....	.....	.....	.....	.....
100.....	1.28	.....	.....	.....	.....	.....	.....	.....	.....
120.....	2.27	.....	.....	.....	.....	.....	.....	.....	.....
140.....	3.52	.....	.....	.....	.....	.....	.....	.....	.....
160.....	5.25	.....	.....	.....	.....	.....	.....	.....	.....

Tables No. 5 and No. 6 for inserting transition curves into existing curves of *small* radii.

TABLE NO. 5.

Degree of Existing curve.	Degree of Intermediate curve.	m	c feet.	e feet.	n feet.	l feet.	k feet.
12° 00′	12° 50′	0.43	28.86	108.39	6.66	68	1.72
11° 30′	12° 17′	0.41	28.91	109.12	6.49	68	1.65
11° 00′	11° 44′	0.39	28.96	109.93	6.32	68	1.58
10° 30′	11° 11′	0.37	29.01	110.85	6.16	68	1.50
10° 00′	10° 38′	0.36	29.08	111.91	6.02	68	1.43
9° 30′	10° 15′	0.34	29.15	113.13	5.87	68	1.35
9° 00′	9° 32′	0.32	29.24	114.56	5.74	68	1.28
8° 30′	8° 59′	0.30	29.32	116 22	5.62	68	1.21
8° 00′	8° 26′	0.28	29.44	118.25	5.52	68	1.13
7° 30′	7° 53′	0.26	29.57	120.74	5.46	68	1.06
7° 00′	7° 20′	0.25	29.72	123.87	5.43	68	0.99
6° 30′	6° 50′	0.23	29.56	120.61	4.71	68	0.92
6° 00′	6° 20′	0.21	29.38	117.23	4.05	68	0.85

NOTE.—For explanation of the terms m, c, e, n, l and k, see text and fig. 3.

TABLE NO. 6.

Co-ordinates of intermediate points on transition curves.

Abscissas.	Ordinates, 12° 00′.	Ordinates, 11° 30′.	Ordinates, 11° 00′.	Ordinates, 10° 30′.	Ordinates, 10° 00′.	Ordinates, 9° 30′.	Ordinates, 9° 00′.	Ordinates, 8° 30′.	Ordinates, 8° 00′.	Ordinates, 7° 30′.	Ordinates, 7° 00′.	Ordinates, 6° 30′.	Ordinates, 6° 00′.
20.....	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02
40.....	0.35	0.34	0.32	0.30	0.29	0.28	0.26	0.25	0.23	0.22	0.20	0.19	0.17
60.....	1.18	1.13	1.08	1.03	0.98	0.93	0.88	0.83	0.78	0.73	0.68	0.63	0.59

The Continuous Heating System of the Pennsylvania.

The diagram given herewith shows the general arrangement of the valves, pipings and couplings used by the Pennsylvania Railroad in its return steam heating system for passenger cars. Last week we gave a general description of the operation of this system, as well as an account of an experimental run between Philadelphia and Jersey City. This diagram shows the exact location of the various details previously described.

The arrangement and operation of the details of this system, as shown by this diagram, may be stated as follows: Steam is taken from the boiler of the locomotive at A through a steam regulating or reducing valve at that point. This valve is located on the boiler butt and is attached to the combination stand, which is supplied with dry steam from the dome, by means of a dry pipe extending inside of the boiler from the bottom of the combination stand nearly to the top of the dome. From valve A the steam is conducted at a pressure of about 60 lbs. through the coupling B, between the locomotive and tender, to a reducing valve at C, where the pressure is reduced to about 3 lbs., when it enters the direct train pipe. The exhaust from the air pump on the locomotive is also conveyed, as shown by the diagram, through the connection E, between the engine and tender, to the tee F in the direct train pipe. It is thus that the exhaust from the air pump is utilized to assist in heating the train.

At the point G, just above the reducing valve C, is placed a tee in the direct steam pipe, from which steam is taken at 60-lbs. pressure to run the steam cylinder K of the vacuum pump shown in the cut, into which it enters at H. The exhaust from this vacuum pump is taken out at a point J, and can be delivered through the direct train pipe or into the atmosphere, as may be desired; this delivery being regulated by the operation of the three-way cock K'. The vacuum pump extracts the condensation and maintains a partial vacuum in the return train pipe by drawing the vapors and water through the port L from the pipe M. This return condensation can be discharged either into the tank at N or into the atmosphere at O by the operation of the three-way cock P, as may be desired.

The steam for heating, obtained from the three sources, *i. e.*, directly from the boiler, from the air pump exhaust and from the exhaust from the vacuum pump, is conveyed to the train through the coupling Q at the back of the tender. This coupling is a straightaway coupling, with a sliding joint for expansion. It is positive in its connection, and is secured by a rotation of the handle shown in the diagram, which causes cams cast upon the face of the couplings to press the joints together. Steam passes out of the direct train pipe to a three-way cock at R. This three-way cock serves to admit the steam to the heating pipe and to shut off the remaining portion of the train pipe when a car is in the back of the train. From the three-way cock the steam passes into a steam reversing valve, shown at the centre of the car, the office of which is to reverse the direction of the entering steam when the locomotive is changed from one end of the train to the other. This reversing valve is operated by the cranks and connections shown in the diagram, which are moved by means of a wrench upon the square end of the valve-stem, which projects through an index plate in the floor of the car, as indicated in the diagram. This index plate is marked "direct" and "return" in duplicate upon each disc, the duplication being necessary in order that the system may be reversible. When the index finger points toward "return" the system is in operation as a return system. When the finger points to "direct" it indicates that the system is being used without the return pipe; that is, as a direct steam-heating system. The steam which is regulated in direction as above shown, enters the steam reversing valve at S, passing out at T and U to the entrance of the controlling valve at V V, from which lead lines of ¾ in. piping directly to the four corners of the car. At these corners are located the coils W, of wrought-iron pipe, into which the steam passes. These coils are incased in a wooden boxing in the top of which are placed registers, which may be opened at will to admit heated fresh air, which rises up over the coil from and through 2¼ in. air ducts, lined with cast-iron thimbles, which are located directly under the coils, in the floor of the car. From these coils the steam passes into the end of the long cast-iron radiating pipe X, which is furnished with thin projecting flus to increase the radiating surface, extending the whole length of the car. These radiating pipes are fastened by round brackets, with a washer and split key, to the truss planking or sides of the car. Into this cast-iron radiator are screwed spurs T' with blank ends, which project outward, one under each seat, as shown. These spurs incline toward the cast-iron pipe. This inclination compels the condensation to return to the side radiators. Underneath each seat, at the joint between the cast-iron side radiators and the spur, is located an air duct 2¼ in. in diameter, lined with an iron thimble, similar to those under the coils at the end of the car, as indicated at S'.

The condensation flowing with the steam in the cast-iron radiators toward the centre of the car, finally reaches the waste valve Y. This valve is the ordinary globe valve, which can be fully opened when necessary. In regular use, however, it is closed and the condensation passes through a notch filed in the valve seat. When the system is used as a direct steam heating system, the condensation passes through this small aperture, which, serves as a draining point in place of the trap. From valve Y the condensation passes into the steam reversing valve at Z and thence to the return pipe, through the three-way cock R', if the system is being operated as a return system, or to the atmosphere, through the opening O', if the apparatus is being used as a direct steam-heating system. The return pipe extends the whole length of the train in the same manner as the direct steam piping, the variations from rectilinear alignment being not greater than 1½ in. at any point. The return pipe is connected by independent couplings the same as those on the direct pipe.

At the tender the return pipe connects with a condensing coil, shown in the bottom of the tank. This condensing coil serves to condense whatever vapor may remain after the steam has passed through the heating pipe of the car. The vacuum maintained by the vacuum pump reaches throughout the entire length of the train in the return pipe, and in mild weather often extends back through the direct pipe as far as the reducing valve C. The use of this system therefore enables the cars to be comfortably heated in mild weather, owing to the possibility of maintaining the temperature of the pipes below 212 deg., which is the temperature of steam at atmospheric pressure. The absolute pressures in these steam-heating pipes varies from 5 to 20 lbs., according to the demands for heat. Thus, in the coldest weather, the ordinary steam gauge would show about 3 lbs. pressure on the heating pipe, and in mild weather such a gauge would show no pressure whatsoever, but an absolute pressure gauge would indicate from 5 to 15 lbs., according to the steam supply.

About the latter part of February a series of trials was commenced with this system upon the Pennsylvania Railroad. Twelve cars were equipped with the devices above described, and with these the trials were made. It was anticipated that the most difficult conditions which this system would have to meet were those upon steep gradients—where the difference in height of the rear and front of the train, as well as the slight dip of the piping would be a greater height than the pump could lift the water of condensation. To determine the effect of steep grades a trial trip was made to Gallitzin under conditions as severe as they could be made by cooling the cars before starting up the grade and leaving the ventilators open. The grade at this part of the line is sufficient to cause a differential height of 12 ft. in the train. To add to the difficulties of the case there was a leaky coupling at the rear of the tender. Considering all of these conditions the demand upon the system was estimated to be as great as it would ever meet upon the Pennsylvania Railroad. The results of these tests showed conclusively that, on grade of this amount, the rear car could be heated as well as the others, and the removal of the condensation was possible even with trains of more than 12 cars. So far the results of the trials have been most gratifying to the officers of the Pennsylvania.

Automatic Safety Stop for Locomotives.

A test was made of a new automatic safety stop on Tuesday morning, March 19, at Neponset, Mass., on the Old Colony Railroad. A special train of four cars left the Boston station of the Old Colony at 10 a. m., carrying the Massachusetts Railroad Commissioners and a large number of the mechanical and operating officers of the railroads centring in Boston.

No change whatever is made in the locomotive. A vertical sliding roof of ⅝ in. iron is attached by guides to one of the upright corner posts of the pilot above, and about four inches outside the rail. When pushed upwards about 1 in. this rod operates to open a small cock or valve, which is connected by a pipe with the train brake pipes. When opened the pressure is relieved in the pipes of the train brake, which causes the brakes to set automatically.

To operate the sliding rod an inclined plane is produced by two pieces of bar iron ⅛ in. by 3 in., which are lifted up beside the rail. A steel roller attached to the lower end of the sliding rod strikes this inclined plane and is pushed up so as to open the cock. The bars are 4 ft. 4 in. in length and placed parallel to the rail and about 4 in. from it on the outside. They are pivoted at one end and slotted at the other so as to be readily thrown up by a wire rope or other means of connecting them with the switch to be protected. An arm or cam is operated by the switch so as to throw the middle portion of the bars up sufficiently to cause the roller to strike and operate the rod.

A portable wooden inclined plane was also tried. This can be carried by the track-walker and hooked on the rail at any point, and causes the train to stop in case of the discovery of any defect in the track.

Four trials were made with both apparatus. In the first trial the brake was set on striking the inclined plane, and the train stopped in two-thirds the length of the engine at a slow

THE BURTON STOCK CAR.

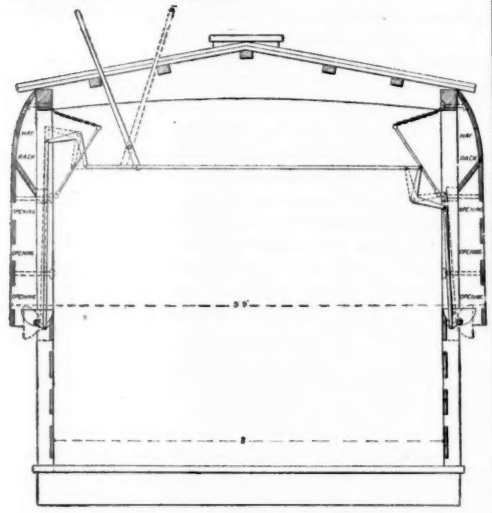
speed. At a speed above 20 miles per hour the stops were made in from 10 to 13 seconds, and the train ran a distance of about five cars beyond the track device.

The device is entirely beyond the control of the engineer, who must get off and close the valve on the pilot by hand before he can proceed. It is constructed by the Rowell American Switch Co., of Boston.

The Burton Stock Car.

Since the Burton stock car was illustrated in the *Railroad Gazette*, Sept. 9, 1887, some important improvements have been made in it. These are shown in the engravings published in this issue. The water trough and the hay rack are put entirely outside of the car space, thus making available the whole interior of the car for transportation of other material than live stock. The carrying capacity of this car is 20 head of cattle or 18 head of horses. It is 9 ft. 9 in. wide over all and 8 ft. in the clear inside, and 38 ft. long.

Water is taken at either end of the car through a trap under the running board. A 4 in. pipe runs the length of the car from one trap to the other, and from this pipe the water is conducted to the troughs by smaller pipes. There is a lever at each end of the car for emptying these troughs, as shown in the sectional view, and when out of use the troughs stand in this reversed position.



The car is equipped with the Westinghouse automatic brake, Safford malleable iron draw-bar and Dunham door. The trucks are M. C. B. standard, with swing beam. The other special features are mostly covered by the patents of the Burton Company.

Six hundred of these cars are at use on the Rock Island Road under lease, and the Burton Company has about 500 running independently over the railroads of the country. The company also owns and operates special cars designed for the transportation of horses, which are provided with all appliances for running in passenger train service.

The peculiar features of this car are so fully shown in the engraving that further description is hardly necessary.

The Superintendents on Continuous Heating.

The Association of North American Railroad Superintendents has issued the following circular: The standing Committee on Machinery was instructed by the Association, at its last meeting, to obtain information from railroads which have tried any method of warming cars by heat transmitted from the locomotive, as to what degree of success has thus far been obtained, with such facts and records of experience as would aid in a better understanding of the requirements to be met and the difficulties to be overcome.

It is thought that the questions herewith submitted for *brief* replies, while not pretending to suggest more than a bare outline of the subject, might serve to bring out at least a partial record of actual results, as well as of variations in practical methods, and would, undoubtedly, be more helpful than mere theories and opinions. It is hoped that there will be a general response from the roads addressed which have had experience in this matter, even though time should not permit full answers to all the questions proposed.

Replies should be forwarded directly to the Chairman of the Committee, Mr. George W. Beach, Waterbury, Conn., and, if possible, before April 6, 1889.

General.

1. With what systems of steam-heating have you experimented?
2. What system have you adopted?
3. How many cars are equipped?
4. How many locomotives are equipped?
5. What is the daily mileage of steam-heated trains?
6. What is the maximum number of cars heated by steam on any train?
7. How do you provide for heating cars when detached from locomotives?
   (*a.*) In case of emergency requiring locomotive to leave train?
   (*b.*) When waiting at station before engine is attached?
   (*c.*) When cars are laid off at junction points?
   (*d.*) Spare cars at terminal points?
   (*e.*) At night after train is put up?
8. Do you use a method of hot water heated by steam from locomotive?
   (*a.*) Advantages?
   (*b.*) Objections?
9. Do you consider train steam-heating, so far as you have tried it, a success?
10. If not, state cause of failure or difficulties it has failed to overcome.
11. What standard of temperature for cars have you established?
12. Do you succeed in maintaining an even heat in all cars of the train? If not, state causes of exception.
13. What is maximum pressure allowed in main steam-pipe?
14. How much pressure is usually required to heat cars in "zero" weather? In "freezing" weather?
15. How much water per car per hour is required under above conditions?
16. Is consumption of coal by locomotives materially increased on account of steam-heating?
17. Do you keep records of train-heating service? (Send samples of reports made, or of blanks used.)

Locomotive Attachments.

18. Where does your main steam-pipe enter the locomotive boiler? Size of pipe?
19. Do you use a reducing or pressure-regulating valve? If not, state reason.
20. How do you guard against excess of pressure in main steam-pipe?
21. Do you use a heater connected with locomotive boiler for supplying hot water to heat train?
22. What is your method of applying the same?
23. What is the average cost of fitting up a locomotive ready for heating service by the system you are now using?

Car Attachments.

24. What is inside diameter of main steam pipe, and where located?
25. How covered to prevent radiation?
26. Is there a cock or valve (state kind) on main steam pipe at each end of car?
27. Does main pipe run level or on a grade, and where is the lowest point?
28. How do you arrange the radiating-pipes inside car?
29. Size of radiating-pipe, and aggregate length of same?
30. Number of square feet of heating surface per car, and average capacity of car in cubic feet?
31. Do radiating-pipes run level or on a grade? Lowest and highest points?
32. Is each side of car piped separately, and can it be shut off (independently of the other) from main steam-pipe?
33. Do you put any radiating-pipe under seats?
34. Do you utilize Baker heater pipes?
35. Do you use radiator coils for ends of car or for baggage compartments, etc.?
36. What is the size and arrangement of the drip-pipe from the car radiating-pipe?
37. What valves are used and where located inside the car:
   (*a*) On steam-pipe?
   (*b*) On drip-pipe?
38. What traps have been tried, and where placed?
39. Which has given best service?
40. What experience have you had with frozen traps?
41. If other methods, except by traps, have been used to remove condensation water, describe same.
42. Do you place a steam gauge in each car, and where?
43. How many thermometers are placed in each car, where placed and kind adopted?
44. Do you have an auxiliary heater in or under car? How is fire applied to same? Kind of fuel used?
45. Ever had any occasion to use such auxiliary heaters?
46. What is the average cost (exclusive of any patent charge) to fit up one car complete for steam-heating by your system?

Couplers and Connections.

47. Do you use an all-metal or a hose connection between cars?
48. What kinds of coupler have you tried? Which has been adopted, and how long in service?
49. How much leakage from couplings?
50. Kind of gasket used in coupler?
51. Has the coupler you use a straight bore or an offset? Size of bore? Trapped?
52. Does it uncouple automatically when cars pull apart?
53. State what you consider the three most essential requisites of a good steam coupler.
54. What kind of steam-hose do you use between cars? State maker's name, length and inside diameter.
55. How heavy hose is needed, and should it be plain, corrugated or wire-covered?
56. What is the average life of your hose?
57. Do you support the hose to car platform, and in what manner? What clips do you use?
58. Does water lodge in bend of hose, or freeze there? Or in couplings?

Ventilation.

59. Do you have a special system of car-ventilation in connection with your heating system? Describe same.
60. Is the regulation of your ventilating appliances under the control of the train-hands, and what rules are made for their guidance?

TECHNICAL.

New London Bridge.

One of the deck spans of this bridge has been erected, and it is expected that all of the superstructure will be up and ready for trains before the end of July. The masonry and foundation work will be completed next month. It will be remembered that this bridge is remarkable as having the longest and heaviest draw span yet undertaken anywhere in the world. This span is 503 ft. between centres, and will carry two tracks. Mr. A. P. Boller is the Chief Engineer, the Union Bridge Co., contractors, and Mr. Alexander McGaw sub-contractor for the masonry and foundation.

The Standard Coupling Co.

The Consolidated Coupling Co. has leased its patent rights and franchises to the Standard Coupling Co., a new corporation. The works and principal place of business of the new company will be at Troy, N. Y., and the officers' names will be announced later.

Locomotive Building.

The Schenectady Locomotive Works will this week deliver to the Cleveland, Columbus, Cincinnati & Indianapolis three passenger engines. The three freight locomotives building for this road will also soon be completed.

The New York Central & Hudson River is having a large number of new locomotives constructed at the Schenectady Locomotive Works.

The Lake Erie & Western will this month receive five new freight engines recently ordered.

Car Notes.

The Cleveland, Columbus, Cincinnati & Indianapolis will build 50 double deck stock cars at the company's shops. They will be equipped with the National Hollow Brake Beam and Westinghouse air brakes. The 84 platform cars, now being built at the company's shops, are about completed. The company has received 550 of the recent order of 1,000 box cars; this includes the entire 200 ordered from the Terre Haute Car Co.; 325 of the 600 placed with the Pullman Co. and 25 of the 200 to be built by the Buffalo Car Manufacturing Co.

The Cleveland & Canton last week placed an order for freight cars with Pennock Bros., of Minerva, O., in addition to the 600 now being built by this firm. Most of these are coal cars.

The Louisville, St. Louis & Texas has placed a new order for passenger equipment with the Ohio Falls Car Co., of Jeffersonville, Ind. This company has orders for freight cars for the Lynchburg & Durham, Kansas City & Pacific, and for both passenger and freight cars for the Kentucky Midland.

The Philadelphia & Reading has let a contract to the Pullman Car Co. for 50 passenger cars for excursion travel. Orders have also been placed for 500 hopper bottom gondola coal cars of 25 tons capacity and also for 50 other freight cars.

The Jacksonville, Williamsport & Anniston road will soon let contracts for six passenger cars and for several light engines.

The Rochester & Glen Haven road will also soon place orders for building its rolling stock.

The Julien Electric Co., of New York, is having six cars built by J. G. Brill & Co., of Philadelphia, for use on street lines in New York. The cars are fitted with storage batteries.

The Ellis Car Co., of Amesbury, Mass., is building a car of special design for the Boynton Bicycle Railway Co. The car will be two stories high, 42 ft. long, 4 ft. wide and 13 ft. high from sills, outside dimensions. The upper compartment will contain 42 revolving chairs. The lower floor or section will be divided into compartments with seats facing, each to hold three persons, similar to the English passenger coach. The upper section will have end doors, and is designed to be reached by a system of two story platforms at stations. The wheels of the car will be 8 ft. in diameter.

The Wagner Palace Car Co. has nearly completed the eight new sleeping cars, to be run between New York and Chicago on the limited express. Four of them will contain 16 sections. The other cars are designed to accommodate families or parties of friends desiring privacy, each car being fitted with ten apartments, with two berths, lavatory, closet and running water in each. The apartments have doors leading into the main aisle (at the side), and are provided with folding doors, which can be opened, turning two of the apartments into one large room. All the cars are richly decorated and handsomely furnished, provided with electric bells and appliances for illuminating by electricity, although for the present gas will be used.

Manufacturing and Business.

A project is on foot to bring about a general convention of makers of wood-working machinery. The idea is to adjust conflicting opinions as to trade methods. No such convention has ever before been attempted.

Francis Whitaker & Sons, of East St. Louis, have placed an order for all their steam pumps for their new packing-house at Wichita, Kan., with the Laidlaw & Dunn Co., of Cincinnati, O. All of them are standard "Duplex" pumps. The Laidlaw & Dunn Co. has also sold two 300 h. p. "Galloway" boilers to the Geo. H. Friend Co., of West Carrollton, O., for its new paper mill.

The Johnson Railroad Signal Co., of Rahway, N. J., has opened an office in the Rock Island Building, Chicago.

The Brunswick & Western is putting in new machinery to cost about $12,000 in the shops, at Brunswick, Ga.

The Lansberg Brake Co., lately incorporated with a capital stock of $2,000,000, have established a main office at 212 South Fourth street, St. Louis. The machinery is being furnished by A. P. Bowman of St. Louis. The officers of the company are: G. Buente, President; Frank Lansberg, the inventor of the brake which the concern will manufacture, Superintendent.

The various automatic car coupling manufacturers complain of the dullness of their business in the West, and state that a large proportion of all their output is used on railroads in the Middle and Eastern states.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

We illustrate in this issue a transfer table designed in the mechanical department of the Pennsylvania Railroad, at Altoona, for which two classes of driving power have been adapted; one an electric motor, the other, a wire rope. We wish to call the attention of our readers to these transfer tables as being the latest in design and highly commendable for excellence in their general arrangements and perfection of detail. We have endeavored to explain as accurately as possible both the arrangements of parts and the manner of operation, hoping that it may be of use to those of our readers who are contemplating the construction of similar mechanism.

The movement of railroad securities this week has been due to other causes than traffic conditions. The failure of the French Copper Syndicate, which has for many months controlled the price of that metal, could not help affecting financial affairs of every kind. Some of the French banks are directly and severely involved. This is not true of American banks in any such immediate fashion. But there is one way in which some of them are indirectly involved. They have in many cases loaned money on copper at 10 and 12 cents. If the market rate should fall to eight cents they may be somewhat seriously involved. Anything which affects banks in this way prevents artificial support from being given to the demand for railroad securities. They have to go before the public on their own merits, or rather, on the popular estimate of their merits, which in times of depression is apt to be unduly low. The failure of the copper syndicate is not unlikely to hamper the bankers who would try to support American securities in European markets. In one respect, this is no disadvantage. In the early discussions about the Inter state Commerce Railway Association, the desire to attract capital for investment was much more obvious than the desire to investigate methods of traffic economy. The scheme was advertised before it was known whether it would prove successful, and the difficulties in the way of its execution have been most unwisely belittled. If the present turn of affairs should make the Association, for the time being, less of a financial enterprise and more a matter of railroad economy, it will be a good thing.

Demurrage reform now seems likely to score a permanent success at Chicago. Notwithstanding the marked success of the Omaha bureau, it was to be expected that the greatest railroad centre in the country would test the practicability of such a revolutionary change, and these expectations were not disappointed. As our readers know, the dealers in lumber, coal and other classes of traffic uttered some very loud complaints and threats two or three months ago, and kept up their "kicking" for a considerable time. But matters have calmed down, and we learn from railroad officers on the ground that the Car Service Association is now running with reasonable smoothness. The superintendents tell the same story as those who have enjoyed the benefit of improved car movement at other times and places. One has saved $500 per month in yard expenses; another finds 25 per cent. of a certain class of cars now idle on his hands; another finds that he bought 1,000 coal cars last year which he might just as well have left for somebody else, and used his money for other purposes; another cancels an order for new storage yards and tracks on expensive land, and so on. All (whom we have heard from) testify to increased promptness and dispatch in handling cars, and to a degree of ease and facility in accomplishing this which can be fully appreciated only by experiencing the pleasing sensation. Surely, after such a hopeful report from a place like Chicago, and after the Omaha bureau has justified itself by a year and a half of prosperous life, no other city can cry "impossible" without giving better reasons than have heretofore been accepted.

Electric Locks for Block Signals.

The writer of the letter in another column on the block system assumes that electric locking of block signals is not an unqualified success. The tone of his last paragraph indicates that he regards the value of devices like the Sykes locking apparatus, in use on the New York Central (in New York City), the New York, New Haven & Hartford and the New York, Lake Erie & Western, as yet to be proved. At first thought this view seems ill-considered, but the author's experience has been on the Pennsylvania, which has used block signals more extensively than any other road in the country, and his views are entitled to weight. The Pennsylvania has no locks on its blocking apparatus, and the fact that the block stations of the roads of Great Britain are still largely unprovided with anything of the kind adds interest to the fact. Let us, then, consider for a moment some of the merits and demerits of electric locking.

Theoretically the Sykes apparatus is a perfect protection against mistakes of signalmen. With it they can never admit a train to a block until the previous train has passed out. That its practical working justifies its claims, at least to a good degree, is evident from the severe test of a line like that of the New York Central from the Grand Central Station, New York City, to Spuyten Duyvil and Woodlawn. It has been in use there for a number of years. The dense traffic on these lines could never put up with any signalling device that gave poor service or caused any unnecessary delays. This apparatus has worked in other places with a substantially perfect record for a long time, and yet managers of good judgment still believe its use impracticable under many circumstances, and evince no desire to adopt it. These men are not all on the Pennsylvania. Without an electrical check the operator has nothing to aid his memory and vigilance but the train sheet; but men of good judgment place dependence upon this rather than try to operate the more complicated system in a mixed traffic.

The Sykes system affords two separate checks upon the operator. Each operator, in admitting a train to a block, must first have the consent of the operator at the farther end of it (whom we will designate as "B," calling the one at the entrance "A"). B controls an electric circuit which locks A's signal lever; but when his own signal lever is at "all clear," as it naturally is while a train is on the way from A, he finds himself unable to work the electric apparatus to unlock A's lever. This is the first check, and under ordinary circumstances is sufficient. If a second train desires to enter before the first has cleared, A finds his lever locked in the danger position, and B finds his own in the clear position, which both reminds him that a train is due and prevents the unlocking of A's lever. But, for reasons which will be readily conjectured, operators have sometimes, when their own or the trainmen's inclinations have dictated otherwise, lacked the honor or the courage to carry out the rules; and, though not by any means in ignorance of what they were doing, they have allowed two trains to be in the same block at once. To provide against this and to make it certain that intentional "blunders" shall not be committed the second check is provided. This is an electro-magnet actuated by a circuit which runs through two or three rails of the track at a point a short distance beyond the end of the block. When B unlocks A's lever he sets the armature of this electro-magnet in a position which prevents his unlocking A's lever a second time; and this armature stays in that position until the train arrives and its wheels touch the rails just mentioned, electrically connecting them to each other and releasing the armature by withdrawing the electric current from its coil. Thus, if the apparatus in the tower is in a closed box the operator can misuse this safeguard only by going out to the track and making a metallic connection between the rails by the aid of a wire or similar device.

It will be seen that both of these checks contemplate the use of absolute blocking only. If permissive blocking—the admission of a second train before the clearance of the first—is habitually practiced the operation of the electric apparatus must be suspended; and a rule which is more honored in the breach than in the observance is no rule at all. Of the American roads which block, we know of only one which allows no permissive blocking whatever. Under these circumstances this difficulty in using the apparatus must be regarded as the chief ground of objection to it. Defective apparatus or care (or the high cost of perfect apparatus and good care) may be taken as the only other ground. The good records made in certain particular cases demonstrate that a serviceable condition of the machinery is not unattainable, so that the general prevalence of a persistent desire to get the benefits of blocking while still retaining all the advantages of running trains close together, as under the old system, must be held principally responsible for the lack of enthusiastic desire to adopt electric locking and the complacency with present methods which seem to be so general.

It may well be that there is a field for both plans. The block system is badly needed on thousands of miles of American roads, which might with little delay be prepared so as to be worked under a reasonably secure system, but which could not be put in condition for the strictest enforcement of the absolute principle without considerable expense, which would involve delay. For perfect working these roads would have to be provided with a good many new side tracks, and many now in use would have to be altered, switches moved, etc. Close adherence to the system involves short sections; this would often mean numerous new telegraph offices, which to a company doing a large business at low rates means a formidable expenditure. Companies subject to these limitations would certainly do well to adopt the block system without electric locking rather than wait indefinitely for the time when they can afford the most complete system. They can hardly make a mistake in so doing, as with reasonable care in administration the poorest block system known is better than the prevailing American fashion of going back to protect by flag, which does not protect.

On the other hand, numerous lines entering the large cities—Boston, New York, Philadelphia, Chicago and others—have a class of traffic which immediately demands the most perfect protection. Passenger stations are near together, so that short blocks would not be excessively expensive. The tracks are in good condition and passenger trains are sufficiently numerous to make it reasonable to run all trains at approximately uniform speed. On a good track, with a complete block system and highway crossings guarded, freight trains might better be run at pretty good speed rather than allow much permissive blocking. It is to be remembered that the English run their freights much faster than we do ours, and with poorer braking power. The acceleration of freight train speeds, even at the expense of some additional engine power, may well prove economical where a slow rate involves very frequent side-tracking for passenger trains on a crowded suburban line. The experience of those who have been most successful with the Sykes lock certainly indicates that all lines whose side tracks are properly arranged, and whose stations are near together should not only have the block signals but should have them provided with the most perfect safety attachments.

It is to be noted that even the Sykes system does not provide for the contingency of a train breaking in two. The first wheels of the engine will unlock the signal and open the way for the following train, while the rear car may have broken off and remained in the block. The operator may at the same time mistake the portion of a train for a whole train and give the wrong signal. But the track circuit, as operated in the Union Electric Automatic block system provides for this contingency and is specially valuable in cases where freight trains have to stop and back off midway of a block section. It locks the signal for one, two or more trains, regardless of how or when they go out of the block, and thus may be made as useful in permissive blocking as with absolute. The danger incident to the first train unlocking the lever for the third, while the second is still in the block which is the same in principle as that resulting from a break-in-two, is provided against. There would seem to be no insuperable obstacles to using this system as a lock; that is, for precisely the same purpose that the Sykes apparatus is used. It might not work well in sections above two miles long, but within that distance it

would, doubtless, be perfectly feasible. The cost would probably be somewhat greater than for the Sykes, though it should not be very much larger; and, as the batteries could be kept indoors, and the apparatus could be somewhat simplified, the price ought to be considerably below that of the regular automatic block system apparatus. The advantage of simplicity would be felt not only in the matter of cost, but in the ease with which men would learn to work and to understand the system. A chief obstacle to the successful introduction of the Sykes system in prominent instances has been the difficulty of making the operators comprehend the principles on which it works. Concealed machines with mysterious names are not favorable to intelligent working. The track circuit system can be explained to any intelligent person in a few minutes so that he will know *and remember* how it operates. With it there need be no electro-mechanical connection between the levers of different towers.

Relief Department of the Burlington Road.

The directors of the Chicago, Burlington & Quincy have, as briefly mentioned in our last issue, decided to establish an insurance organization for the employés of the company. The details* are very closely copied after those of the "Voluntary Relief Department" of the Pennsylvania, and the association is to be put in operation in about two months.

The advantages of a scheme of this kind, and the points to be commended, are obvious. The employer performs a distinctly generous act toward its employés and binds itself to keep it up continuously. The Burlington directors have done an undoubtedly wise thing, and are to be congratulated on their sagacity. The fact that recent bitter experience has given them more than ordinarily acute perceptions in this direction does not make their action any less wise. It is to be noted that any company not in the enjoyment of financial strength might be doing its men harm instead of good by assuming charge of their money matters, but there is no reason to fear anything in this line in the present case. Certain employés of the Philadelphia & Reading, who a few years ago accepted shares of the company's stock in part payment of wages, came out at the little end of the horn. In Massachusetts there is a special law permitting corporations to contribute to funds of this kind and protecting all moneys thus paid in. Such a law is eminently reasonable and should be provided in every state. No Massachusetts company has as yet taken advantage of it, however.

The special feature of the Burlington Association as of the older concerns which it imitates is the assumption by the company of those parts of the burden which are the most uncertain or the hardest to provide for. Taking the risks of the first few years is a lift which could not be purchased for money, and may be the difference between life and death to a concern of this kind. Securing faithful and efficient officers is a point which sometimes seems attainable by neither love nor money in an association of "workingmen." The whole scheme constitutes a constant and tangible evidence to the men that they are not working for a wholly soulless and impersonal organization or machine, and thus secures a sort of fidelity that is universally regarded as more valuable than that given for mere money.

The other side of the question may be briefly summed up by saying that the scheme interferes with men's freedom. The "American" idea of perfect independence, of resentment of all dictation or assumption of fatherly prerogatives by an employer is violated. Theoretically, the American railroad man would refuse a gratuity of $10 a day if in accepting it he placed himself under any indefinite obligation to allow "dictation" by the employer. The Baltimore & Ohio Relief Association is now undergoing reorganization, because certain members—influenced, it was said, by "labor agitators"—asked the Maryland Legislature to repeal its charter on the ground that the railroad company made the organization a means of coercing its employés. This feeling, however whimsical it may be, should be taken into account.

The actual restrictions placed by the company upon the men in return for the support granted the association are: 1. The company has a voice in the management of the association. 2. There is a slight loss if one leaves the service of the company. 3. Members give up a chance which they would have of securing a larger indemnity if, in case of personal injury by the fault of the company, they were independent and entered a suit at law for damages. These features are, we believe, common to the Pennsylvania, Reading and Burlington plans. The question of possible abuse by the company of its right of voting in the Governing Committee has never come up and very likely never would come up. The Pennsylvania, however, has seven representatives on the committee to six from the employés, not counting the superintendent of the department.

The Pennsylvania organization now has a surplus of $170,000 ($9 per member), which it has accumulated in three years. It is proposed to use this for the establishment of a pension fund. It might be said that the rates of the monthly dues (fixed by the railroad company), had been placed too high, and that thus the company had compelled the men to save $10 apiece in three years against their wills, but this is only a theoretical point as the running expenses, paid by the company, amount to about this sum. Of the money paid in by members, a portion, say one third, goes to pay for ordinary life insurance to be paid out to the beneficiaries of members who die from causes other than accidents in the discharge of duty. A man who resigns from the service of the company loses a portion of this. Whether the contribution of the company to the insurance he has received up to the time he resigns has been of sufficient value to him to offset this loss is a question, which it would probably be hard to decide mathematically. Whether this be so or not, it is very unlikely that this basis will actually be adopted by many men in their own cases. Other considerations wiligovern them.

A newspaper announcement that a certain engineer's widow has secured a $10,000 verdict against a railroad company for killing her husband acts as a strong temptation to many men, when under the influence of a lawyer hungry for a case, to believe that a moderate sum, say $1,000, is a contemptibly small indemnity, and that membership in an association, with its accompanying limitations, therefore involves a considerable hardship in this particular. This is a delicate point. One of the most cherished of our "free institutions" is the privilege of collecting ten times what an injury should be rated at, and of using up the nine-tenths surplus in expenses and attorney's fees. There is little use in arguing the question, but few who are conversant with such matters will doubt that the total net amount actually received for injuries by the employés of a given road in a given time, will be less by the chance plan of fighting in the courts for a big sum than it would be in a fairly conducted association. When to the uncertainty concerning the sum is added the inevitable anxiety of principal and friends in such cases, the advantages of a stable provision are decided.

But without speculating further on these debatable points, it is fair to commend these mutual associations simply for their reflex advantages, so to speak. A man may or may not pay into the fund 25 cents a month more than he ought to pay; his individual liberty may or may not be surrendered to the officers of the road a fraction more than is theoretically right; but the constant intercourse between employer and employé, the added lubrication of the channels of friendliness and the ever recurring occasions that call attention to the mutual obligations and dependences of master and servant, have a value that outweighs all possible losses. To be brotherly, which railroad men pride themselves on being, more or less burden *must* be borne somewhere. Public opinion, in this country at this day, may be depended upon as a safeguard against any remote contingency of flagrant injustice. The spirit of the Pennsylvania management is apparent in the item of nearly $9,000 paid out by the company the past year in pure gratuities, over and above the obligations of the association. The average American directors' board would probably be no less intelligent and generous. All material features of a scheme like this should be open and free to the investigation of all members; every condition should be frankly explained at the outset, and the financial burdens should be scrupulously adjusted so as to avoid any possible undue influence on the rate of wages or on the motive for leaving or not leaving the company's service. With these points guarded, we could hope to see many imitators of the four large companies that have led off in this action.

*The membership is entirely voluntary, and any member can withdraw at any time. The company defrays all operating expenses, and takes charge of funds, allowing 4 per cent. interest. For the first 6 months employés will be admitted without regard to age or physical condition, except that they must be in sufficiently good health to peform their duties. After that none over 45 years old will be admitted. The monthly dues vary from 75 cents to $3.75 a month, and the benefits from 50 cents to $2.50 per day. The death benefits vary from $250 to $1,200. An employé injured in the service does not lose his right to sue the company, but if he sues he is not to enforce his claims against the association.

The Inter-state Commission and the Operating Department.

The efforts to regulate railroads by law have not yet gone so far in mechanical matters as in those involving the relations of the roads to their customers and to each other, but they are constantly working further into the mechanical field. The establishment of the Inter-state Commerce Commission suggested naturally the question of some national control of the roads in technical matters. State legislation is assumed to have been inefficient largely because it has been conflicting in different states, or because people feared that it would be so. The Inter-state Commission seems to offer a means of harmonious action.

The Massachusetts Commissioners a year ago urged upon the Congressmen from that state some action looking toward national influence in technical matters. A resolution was suggested instructing the Inter-state Commission to consider the questions of couplers, brakes and train-heating, with a view to making recommendations in the premises to the railroads engaged in inter-state business, and to suggesting such legislation as might be expedient or necessary. The Legislature of the state adopted and forwarded to Congress a resolution embodying the same ideas, and similar expressions were sent to Congress by various state Commissioners. It is not known that any action was taken by the Congressional committees, to which these communications were referred. At the convention of State and Inter-state Commissioners lately held in Washington, a resolution was adopted requesting the Inter-state Commissioners to consider what can be done to prevent death and injury in coupling accidents and in braking, and how continuous heating can be promoted. This resolution did not express any theory on the part of the state Commissioners as to what the action of the Inter-state Commissioners should be. Probably they would have found it impossible to agree upon any definite recommendation.

To those who believe that in the railroad manager the vices of carnal man are raised to the n^{th} power, and that only a strong guardian can keep him from doing that which is wicked, or even stupid, the idea that he should get "harmonious," advice and instruction from government officials or from congress is very attractive. On the other hand, those who believe that the most rapid as well as the most enduring development is made when people are interfered with the least are jealous of everything that tends to the extension of government control into the affairs of the railroads.

The proposition that the scope of the work of the Inter-state Commission should be extended to include details of mechanical practice can only be sustained by showing great need for it, and very good reason to expect good results from it. On general grounds the weight of probability is overwhelmingly against it. Every detail of track, rolling stock and machinery stands to-day as the result of the experience of a multitude of men who have had the greatest interest in its perfection. Their own fortunes have been involved in the result. Every improvement that is made is the result of experiment, discussion and criticism. That a state or national commission should be able to judge better than the officers of the railroads themselves as to the fitness for adoption of any given appliance is, on the face of it, unreasonable. That any body of public officials, exercising the highest authority, could have brought the railroads of the country to the mechanical condition which they have reached through the combined efforts of thousands of keen professional and business men is absurd to suppose.

Is there good reason for the interference of state or national governments in technical matters? It is very generally assumed that there is. The great loss of life and limb in coupling accidents is cited, and the law is invoked to compel the use of automatic couplers. The fatalities among brakemen falling from the tops of freight cars seem to demand the instant adoption of the automatic brake. The deaths from burning in train accidents have inspired much legislation against the car stove. Accidents at grade crossings brought about laws to compel stops at such points, and the use of interlocking signals Bridges have recently received much attention, and various classes of minor accidents have been the subject of legislation.

No humane man would deny for a moment the obligation resting upon the railroads of making work in their service and travel by their lines as safe as they can be made. No reader of the *Railroad Gazette* can be ignorant of the unceasing efforts that we have made to point out the causes of individual accidents, and the weak points in usual practice. But we are very doubtful of the efficacy of laws in preventing the kinds of accidents that have been most legislated against, and we think it highly probable that some of the laws have done more harm than good.

In the matter of automatic couplers, for instance, it is fortunate that laws enacted within the last four or five years have not been enforced. Had they been

the end would have been retarded. There would to-day have been large numbers of cars fitted with expensive couplers not of the M. C. B. type. To discard these now would not only be a slower process but a more expensive one than to get rid of the link-and-pin coupler. Indeed, at least one railroad commissioner, until quite recently, refused to authorize the M. C. B. type of coupler for use in his state, although several applications were made for it. Other commissioners approved any one of half a dozen, none of which will couple with the type now most likely to come into general use, without the intervention of a link. The wide adoption of these would only have perpetuated the confusion. In the light of present knowledge it can hardly be said that the railroads have been unreasonably cautious in adopting an automatic coupler, and their present attitude in the matter is as satisfactory as can be expected. It is but quite lately that tests have satisfied the mechanical officers that heavy freight trains can be handled without "link slack," and that the M. C. B. coupler will stand the severe shocks to which it will be exposed. Even yet some of the makers are not in a position to fill their orders with the necessary rapidity, and new cars for which the new coupler was specified have lately been turned out with the link-and-pin coupler because the other could not be supplied in time.

In the matter of the automatic brake the situation is much the same. It is but little more than a year since a brake apparatus that could be used on a long train has been procurable at any price. To-day the roads are introducing the new freight train brake with commendable speed, and it is doubtful if any official pushing could much hasten matters.

The legislation against the car stove has undoubtedly stimulated inventors and has forced forward experiment by the railroads, but the benefit has by no means been unqualified. Many roads have been forced into an expenditure, much of which will shortly be wasted. That is, many details have been adopted which are quite sure to be superseded by better ones within a year or two at the farthest. It must be regarded as fortunate that the heating laws have not been pushed any more vigorously.

In all of these three most important matters, then,—the use of automatic couplers, automatic brakes and continuous heating,—we conclude that there is no good reason for further interference by the states or the general government, and that it is fortunate that no more vigorous measures have been taken by the various legislatures and executives. In all of them, and in other technical affairs, excellent recommendations have been made, and foolish ones as well, and the public agitation which has accompanied official action has had good results; but the really valuable public service has been rendered by those commissions which have hired experts, made careful studies and then made recommendations that were obviously based on knowledge and reason. In a similar way the Inter-state Commission could do useful work in technical matters. It could, by using the services of competent engineers, collect and digest information, and its recommendations would often have a consideration in a board of managers that the same suggestion would not get coming from the officers of the railroad. It is not likely that the Commission would undertake such work without a larger appropriation than it has available; and it is not likely that it would undertake the work without being sure that its conclusions would command respect.

Two Years' Operations on the Illinois Central.

The Illinois Central virtually publishes two reports this year—a financial one, from which the Iowa lines are excluded, and a report of operations in which they are included. The former has been out for some time; the latter has only just appeared.

Looking first at financial results, we find the income account, slightly rearranged so as to conform to the practice of other roads, to be as follows:

Gross earnings	$11,822,476
Operating expenses and taxes	7,754,605
Net earnings	$4,067,871
Other income	730,204
Total income	$4,798,075
Rental, C., St. L. & N. O.	1,376,094
Interest	1,024,020
Sinking fund	50,000
Permanent improvements	220,781
Dividends (3½ and 2½ per cent.)	2,400,000
	$5,070,895
Net deficit	272,820

If the sinking fund and permanent improvement expenses be set off against this deficit, it is reduced to the merely nominal sum of about $2,000. Practically, the company has just about earned its six per cent dividend, if relieved of its sinking fund requirement.

There is one extremely bad thing in the financial statement which we cannot avoid noticing. In some figures which were inserted for the purpose of comparisons with 1887, the net earnings for that year were given as $4,919,439, "from which should be deducted the net earnings of the Iowa Division during nine months of that year, $346,005." In point of fact the whole rental of the Iowa Division had already been deducted to get the sum of $4 419,439. In 1888 no such rental was paid. The proper figure to use as the basis of comparison was $5,390,550. By this error the loss of income of the company from one year to the next was made to appear less than $600,000 instead of being, as it actually was, over $1,000,000.

This loss was due to increased operating expenses. The General Manager's report, which includes the Iowa lines, but whose *relative* results would not be greatly affected by their complete exclusion, shows a gain in gross earnings. The figures are as follows:

	1888.	1887.
Freight	$9,125,527	$9,034,862
Passenger	2,842,518	2,785,407
Total, including miscellaneous	$13,660,245	$13,546,287

Freight earnings show an increase of one per cent., passenger of two per cent. Miscellaneous earnings have decreased slightly, but not enough to offset this gain. The change has been in operating expenses, where we find an increase in every important item, and an aggregate change from $7,310,941 in 1887 to $8,633,475 in 1888. This gives a difference of $1,322,534, or 18 per cent. The change is obviously very large, coming as it does without any considerable increase in mileage (2,453 in 1888, against 2,355 in 1887). Let us look at some of the items.

Station expenses show an increase of over 13 per cent.; the increase in number of tons or passengers carried is considerable, but not nearly so great as this. The tonnage has increased from 4,910,248 to 5,266,187, or seven per cent.; number of passengers from 6,949,852 to 7,184,691, or three per cent. Roughly speaking we may say that the terminal expenses per ton or per passenger average something like seven per cent more in 1888 than in 1887.

The increase in movement expenses is, perhaps, not quite so large proportionally, but is in some respects still more striking. The figures are as follows:

	1888.	1887.	Increase.
Mileage of locomotives	14,857,053	13,557,308	1,299,745
	Cents.	Cents.	Cents.
Cost of oil, tallow and waste per mile run	0.31	0.30	0.01
Cost of fuel per mile run	5.24	4.98	0.26
Cost of wages per mile run	5.78	5.58	0.20
Cost of repairing locomotives per mile run	3.56	3.29	0.27
Cost of cleaning per mile run	0.23	0.22	0.01
Total cost per mile run	15.12	14.37	0.75

This change is the more remarkable because the average train load showed no corresponding increase. It is evident that there have been conditions adverse to good economy, independent of traffic matters themselves. Of course there was plenty of reason for increased operating expenses in the increased volume of low grade traffic, but it does not account for the whole change.

The freight traffic statistics are as follows:

	1888.	1887.
Tons of freight transported	5,266,187	4,910,248
Revenue from same	$9,125,527	$9,034,862
Average revenue per ton	$1.73	$1.84
Revenue per mile of road	$3,718	$3,836
Mileage of engines hauling freight trains	7,654,328	6,683,630
Revenue per mile run	$1.19	$1.35
Tons of freight carried one mile	963,929,719	830,970,523
Average distance each ton was carried	183	169
Revenue per ton per mile	95-100c.	1 09-100c

The results may be summed up by saying that tonnage has increased slightly, and average length of haul decidedly, so that the ton mileage shows an increase of 16 per cent, but the average receipt per ton has nevertheless fallen, and the receipt per ton mile has fallen very greatly, so that the aggregate freight earnings have increased but little. Pretty much the same things may be said of passenger business. Meantime an increased train service has been required for the larger movement, and increased station expenses for the larger volume, but this extension, instead of producing better economy per ton or per mile, has been accompanied by a relative loss in both respects. As a final result, we have the following figures:

	1888.	1887.
Gross earnings per mile run	$0.94 25-100	$1.03 16-100
Operation expenses per mile run	.59 56-100	.55 68-100
Net earnings per mile run, without deducting rentals or taxes	.34 69-100	.47 48-100

We do not believe that the Illinois Central is worse off in these respects than other roads. We have reason to believe that it is better off than most of them. Its traffic management stands deservedly high. It simply tells the truth more fully than some others. Figures of this kind are, therefore, specially instructive not merely for what they tell about the Illinois Central, but for the light they throw on the general situation.

The present railroad crisis differs from most of its predecessors in the fact that it is so much more severe in railroad business than anywhere else. In previous crises the railroads have lost a great deal of money, but they have also saved at some points. A time of railroad depression has been a time of low wages and cheap fuel. Such is not conspicuously the case to-day. Coal is high enough to leave the producers in a fairly prosperous condition. The general demand for labor gives little opportunity to economize on that item. The result is that, while some other periods show much worse losses in traffic and earnings, there have been few or none where we find as severe losses in economy. The details of the Illinois Central report are especially valuable for the emphasis with which they teach this lesson.

Shocks, Triples and Brake Gear.

The shocks in the tests on the Chicago, Santa Fe & California, referred to by a correspondent in another column, cannot be attributed to an irregular application of the brakes, as far as the triple valves and the air brake apparatus are concerned. While the point made by our correspondent is true of the slow-acting triple, and is assisted by the use of the old-fashioned engineer's valve, yet the fact is that the triples in the train above mentioned were all new and quick acting, and were operated by the latest form of the engineer's valve. There is one point which the remarks of our correspondent calls to mind, and which will fully explain the causes of such shocks as are daily recorded, and are liable to be experienced at any time when long trains are suddenly stopped; it is that, even with the use of electricity as an operating medium, shocks cannot be avoided in mixed trains with a miscellaneous variety of brake shoes, leverages, piston travel and loads. There is "many a slip" between the simple operation of a triple-valve and the application of the brake-shoes to the wheel with full braking effect, and, what is of quite as great importance, the same braking friction on the tread of the wheel does not produce the same rate of retardation on loads of various weights.

While it is desirable to have the air admitted to the air cylinder as rapidly as possible, and our efforts to that end should not be in the least relaxed, yet it is still more necessary that the auxiliaries which enter into and make a quick acting brake should receive their share of attention, otherwise the good to be obtained from the acquisition of a quick acting triple will be lost. Among these auxiliaries may be mentioned the following: uniformity of piston travel, leverage, brake beam deflection under equal loads, length of brake shoes, and friction of brake shoes per pound of brake beam pressure. We think it is a fact that the triple valve in its present development as an element of quick acting brakes, is well in advance of the development of the auxiliaries above referred to, and that this is appreciated by railroad men in general, is shown by the appointment of a committee of representative railroad officers for the purpose of recommending a standard for the various details of the brake gear.

As an instance of the necessity for minimum, as well as a uniform, brake beam deflection, we call attention to the small deflection of the brake beams called for by the committee in its recent circular. This deflection has been criticized by some as being too small, but it cannot be considered as too much so when it is remembered that any movement of the centre of the brake beam is greatly magnified at the air cylinder piston, with the result of reducing its effective travel materially.

In conclusion we may say that while there may at some future date be a need of a more rapid acting braking device than we now possess, yet that future is far distant; and when railroad companies realize even the minor advantages of a close automatic coupler and extensively use the practicable and serviceable designs, now offered them, they will not only reap rewards which will far more than compensate for the greater first cost of such couplers, but we shall hear less of train breakages, and the day for the necessity of a quicker acting brake device will be postponed still farther into the future than it now is. Instantaneous admission of air into the air cylinders is not sufficient to remove, in all cases, the possibilities of shocks during emergency stops.

The Pennsylvania Exhibit at the Paris Exhibition.

The Pennsylvania Railroad has responded to the call of the promoters of the Paris Exhibition and sent an exhibit which will illustrate some of the peculiarities of American railroading. The following is a list of the exhibit:

Section of passenger car.
Passenger car truck.
Freight car truck.
Section of box car, Janney coupler.
Section of gondola car, wrought iron coupler.
Pair of wheels on axle.
Worn out wheel with high mileage.
Wheel spoiled in casting.
Wheel broken to show strength and chill.
Section of standard rail and rail joints.
Book of photographs.
Book of specifications.
Cast-iron wheel in flask, with piece cut out, showing method of casting.

The cast-iron chilled wheel exhibit will perhaps be of more interest to the railroad man on the continent than any other feature of this exhibit. We hope that other railroads have shown the spirit of the Pennsylvania, and have responded to the call for exhibits of actual practice. It is not yet too late to add to the American exhibit, and as it is most desirable that our railroad engineers who visit Paris be enabled to call the attention of foreign engineers to the commendable features of American railroad operation, it is to be hoped that we shall, as a country of vast mileage, show our confidence in our railroad devices and send representative exhibits of the best American methods of construction and operation. Engineers as well as civilians have been known to return from abroad imbued with foreign ideas to an extent which excludes appreciation of home talent for some months after the traveler's return. Bearing this in mind, and remembering that many American engineers will visit the Exposition, it may be well from an economical standpoint to send such an exhibit of American railroad details as to prevent, by providing for actual comparison of American with foreign engineering, the paralysis of American talent which has been known to follow a European tour.

A ride on the new compound locomotive "Pennsylvania" from Altoona to Gallitzin, up the steep grades, gives one an idea of the working of such locomotives not easily obtained in any other way, and the return, without a train, suggests a toboggan slide 12¼ miles long. Some notes of such a trip made last Saturday may be of interest to our readers. At starting the locomotive was coupled to the mail train leaving Altoona at 3:35 p.m. at the head of two Pennsylvania 8-wheel locomotives. The English runner was on the foot plate. At starting the rear drivers are allowed to slip a few turns until the low pressure cylinder has a supply of steam at a pressure of 40 lbs., as shown at the gauge connected with the receiver. The valve motion regulating the steam admission to the low pressure cylinder is almost always run at full gear. This gear is operated by a separate reverse lever not unlike our own type. The valve gear for the high pressure cylinder is operated by means of a screw and wheel with a handle attached as the custom is on English locomotives. The location of the cut-off point is shown by an index finger on the screw itself. Soon after starting the initial pressure in the large cylinder drops to 30 lbs. At this time the locomotive is exerting sufficient power to slip all of the wheels. The weight upon drivers being about 65,000 lbs., the pull upon the draw-bar must be considerable. One of the most noteworthy features of the action of this engine, and one which should give us all "food for reflection," is the action of the fire under the infrequent blasts from the exhaust nozzles. The number of blasts in a given time is just one-half of those from the common locomotive having the same size of drivers and running at the same speed. The reason of this is that there is only one low pressure cylinder. With these infrequent blasts, and with a low force of blast scarcely audible in the cab, the fire burned brightly, and supplied sufficient steam for the locomotive to exert its full power on the very steep grades at that part of the line between Altoona and Gallitzin before and after reaching the "Horseshoe Bend." This locomotive is fitted with a re-entering fire door and the very small amount of smoke issuing from the top of the stack showed the advantage of admitting air to the firebox above the fire and deflecting it downwards upon the bed of incandescent coal. While passing around curves the engine showed no more tendency to "grind" or bind on the track than the average American locomotive, but one could see that she had been designed for very smooth roads; this was evident from the shortness of the springs and the consequent "rough riding" when passing over the proverbially good track of the Pennsylvania. The tender is a model of economical design and presents to the mechanical department of our American railroads a design which is easily repaired, readily accessible at all times, and one which will pass curves readily and ride like a passenger car. While we do not believe that this locomotive as a whole, or in any large collection of its parts, will be adopted by American railroads as a standard design, we do think that the study of the elements of her design will lead to new inventions and prevent our own mechanics from falling into grooves of opinion which is the way of all mankind when left to its own admiration.

Jay Gould, as President of the Manhattan Railway Co., has written a long letter to Mayor Grant, setting forth that the plan for devising new rapid transit lines in New York City, as recently proposed by the Mayor, is wholly unnecessary, and that with proper aid and authority from the city the present elevated lines of his company can be enlarged and developed so as to make them adequate to all needs. The points made are: 1. That the elevated system is better than the London underground, or any other intramural system now in existence. The longest ride on the New York elevated, which costs 5 cents, is equal to one for which in London 36 cents has to be paid. 2. With adequate terminal facilities, either one of the four existing lines could carry the daily traffic of all four. During the recent strike the travel of the surface horse railroad lines was easily taken care of. The train service was adequate to carry a million passengers a day. The average number of passengers per train mile is only 23. 3. The lines have carried 1,069,487,620 passengers, of whom but one has been killed in the cars. Of the total (47) killed on the road not one was free from contributory negligence. 4. Terminal facilities are needed at South Ferry and City Hall. At the latter place the street is sufficiently wide, and such facilities would not interfere with the surface travel. At South Ferry the company should be allowed to construct a loop, as was recommended by the Rapid Transit Commission in 1887. These improvements would add one-third to the carrying capacity of the lines during commission hours. The recent large increase in traffic has been almost entirely during the former "ten-cent" hours. Of the large increase in passengers last year only 8 per cent. was during commission hours. 5. Express trains from 155th street to Rector street run through in 33 minutes. By completing a third track on the Third and Ninth avenue lines, and running upon them express trains, down in the morning and up in the afternoon, the through traffic to and from the extreme northern end of the island, which is now light, could be greatly developed without interfering with the present way traffic. The Manhattan Company, in addition to furnishing the best rapid transit in the world, pays a higher rate of taxation than is levied upon any other class of property. The total tax for last year was nearly one-fiftieth of the entire sum raised in the city. Mr. Gould then goes on to detail the rise in values of real estate resulting from the building of these roads. In view of these facts the company should be entitled to consideration at the hands of the people.

This is a clever and plausible statement of the case, and the praise of the good features of the existing service is justified; but it is very unlikely that the people of New York will accept the arguments for granting further privileges as entitled to much weight. In asking to erect more lines in Battery Park and in the street near the Brooklyn bridge, Mr. Gould is simply reopening an old question. The tone of the press of the city indicates that it has already been decided, and that the people desire, in any new move, to avoid the evils both of the present elevated and of the London underground systems. Of course no one pretends to propose an underground system unless smoke can be avoided and ventilation secured. The third track scheme has merit. It is impracticable, however, to run numerous additional trains in one direction unless there is either a fourth track to return them on or storage tracks provided to hold the accumulated cars. With the present terminal facilities the trains that rush down in the morning have to be immediately rushed back up-town, so that the up track is as crowded as the other. Possibly the Ninth and Second Avenue lines could be partially utilized for sending empty cars back. While the city cannot afford to give up its parks it can and should see that the road has unfettered power to take private property for terminals at reasonable prices. It is to be remarked in passing that this extensive returning of empty cars accounts for the small average train-load mentioned in the letter. The complaint that the company allows passengers to ride standing, not only during busy hours but at other times, when by additional trains all might be given seats, appears to be one of the best founded now made.

The point concerning the small increase of traffic during busy hours is the most important in the letter, and does show that transient travel may still be considerably developed. But it does not indicate any method of driving to Ninth and Second avenues the people who persist in crowding on to the Sixth and Third avenue cars, nor does it alter the fact that in the busy hours the capacity of the two-track line is already so taxed (and was two years ago) that any considerable increase was impossible. At best the city must get along with the present roads for some years, for much time will be required to build a new road of any kind; the elevated lines should therefore be developed to their full capacity. Additional main tracks seem to be the most feasible way out of the difficulty; and it does not appear that four tracks would injure the streets (in the main) much, if any, worse than would three. Even with these new tracks there would still be quite formidable complications in station arrangements to be met.

The railroad statistics of the German Empire, prepared by the Imperial Railroad Bureau, have recently appeared for the year ending March 31, 1888. At that time there were 24,274 miles of railroad in the Empire, which has 47,540,000 inhabitants, or 1,958 per mile of railroad, while in this country there were about 420 per mile of railroad.

The equipment of the German railroads consisted of:

Locomotives.	Pass. cars.	Freight cars.	Mail cars.
12,811	23,703	518,526	1,587

The cost of this railroad system was $2,475,536,737, of which nearly one-sixth was for rolling stock. The passenger cars have in the aggregate places for 1,016,377 passengers—an average of 43 per car, and the freight cars, as the report puts it, have capacity for 2,748,800 tons; but as this is an average of only 10,500 lbs. per car, there is probably some mistake here.

The traffic of the year reported was equivalent to 305 passengers, and 652 tons of freight carried each way daily over the entire system, and the locomotive mileage, which would have surrounded the earth at the Equator more than 10,000 times, was equal to passing 14⅓ times each way daily over the whole road.

The number of train accidents and the victims were:

	Accidents.	Killed		Injured	
		Employés.	Others.	Employés.	Others.
1887-88.....	2,521	267	196	909	798
1886-87.....	3,641	286	234	1,453	1,621

The very great decrease in accidents is most remarkable and most creditable. It is ascribed largely to the greater use of safety appliances of various kinds—speed recorders, interlocking, improved signals, continuous brakes, etc. The number of killed and injured per million train miles fell from 19.95 in 1886-87 to 11.27 last year.

The number of employés was 343,400, an average of very nearly 14 per mile of road, which is probably 2½ times the average in this country. One man out of every 140 in Germany is a railroad employé; in the United States probably not more than 1 in 80. Nevertheless the amount of transportation effected per employé is about three times as great here as in Germany.

The Atlanta *Constitution* prints each day a list of the passenger trains arriving in the city behind time, and appears to have excited considerable comment by this novel idea. The manager of one of the roads felt considerably hurt, and in an interview complained that in the case of delays, which were wholly attributable to the fault of connections beyond his terminus, his road received all the blame. His engineers, he said, were sensitive about this "black list," and had run too fast for safety in order to avoid this unjust fling at their reputations. The *Constitution's* table shows up thus:

THE DELAYED TRAINS.

		Due.	Late.
E. T., V. & G.....	Train No. 11	12:32 a. m.	0:50
" " "	Train No. 12	1:50 a. m.	0 25
Central R. R.....	Train No. 3	7:00 a. m.	6:20
" "	Train No. 11	1:10 p. m.	2:35
" "	Train No. 1	5:40 p. m.	2:50
" "	Train No. 13	10:25 p. m.	3:28
Georgia.....	Train No. 1	5:45 p. m.	1:40

Annual Report of the Chicago, Burlington & Quincy.

The following is an abstract of the annual report of this company for the year ending Dec. 31, 1888:

The actual length of road in operation Dec. 31, 1888, was 4,917 miles, against 4,693 miles Dec. 31, 1887, an increase of 224 miles. The average number of miles operated by the Chicago, Burlington & Quincy in 1888 was 4,859, against 4,239 the year before. The principal increase in mileage was: In Illinois, 59 miles; Missouri, 36; Nebraska, 80, and Kansas, 39 miles. The total second track is 294 miles, of which 204 miles is in Illinois and 86 in Iowa.

The equipment at the end of the year is as follows:

Engines	689
Passenger and combination cars	354
Baggage, mail and express cars	134
Dining cars	7
Officers' and pay cars	11
Way cars	352
Boarding cars	15
Wrecking cars	8
Box, freight and cattle cars	20,130
Platform and coal cars	5,599
Pile drivers	5
Hand cars	1,429
Rubble and iron cars	1,009

The addition to equipment during the year included 51 locomotives, 38 cars for passenger service and 431 cars for freight service.

The operations were as follows:

	1888.	1887.
Miles operated	4,859	4,293
Earnings	$23,789,168	$27,576,078
Expenses (taxes included)	18,882,460	16,097,913
Net earnings	4,906,708	11,478,165
Per cent. of exp.	79.37	58.38
Gross per mile	$4,895	$6,505
Net per mile	1,010	2,708
Passengers carried (exclusive of mileage and season tickets)	5,968,148	5,750,348
Earnings from passengers	$6,146,121	$6,629,859
Tons freight	9,056,665	9,752,325
Earnings from freight	$15,484,035	$18,675,655

The general account is as follows:

Debit.

Capital stock	$76,393,505
Funded debt	92,753,708
Contingent liabilities for branches	6,912,281
Accounts payable	7,006,831
Profit and loss	6,466,469
Renewal fund	9,000,000
Income account	10,916,702
Sinking fund	14,820,413
	$224,269,909

Credit.

Construction and equipment, Dec. 31, 1887	$100,744,896
Construction in 1888, main line	452,286
Equipment in 1888, whole line	1,060,219
Branch construction to Dec. 31, 1887	60,290,190
" " " in 1888	3,771,536
Investments in railroad securities	26,810,995
Sundry investments	656,689
Material on hand	2,579,791
Sinking fund trustees	11,766,512
Current accounts and cash	7,118,795
	$224,269,909

The income account is as follows:

Debit

Balance from 1887	$15,248,127
Earnings	23,789,168
Interest, etc	169,601
From B. & M. R. R. R. in Nebraska Land Grant	408,556
	$39,615,452

Credit.

Operating expense	$17,804,113
Rentals	193,709
Interest	5,111,527
Taxes	1,078,347
Dividends	3,819,578
Sinking fund	691,476
Balance	10,916,702
	$39,615,452

Some extracts from the President's report follow;

After many prosperous years the Chicago, Burlington & Quincy has experienced a year of serious reverses. After

paying our fixed charges, including about $700,000 contributed to sinking funds, and dividing five per cent. upon the capital stock, the accounts show a deficiency for the year of $4,331,425.41, which it has been necessary to take from the accumulated surplus of the company.

Chief among the causes of the falling off in net revenue from the operations of the railroad was the strike of engineers and firemen in February. This cause was not the only one, however. There has been a diversion of traffic to new competing railroads, and also a decline in the rates, as compared with the year before.

The decline in rates has been due principally to the difficulty of self-regulation among the railroads without the right to pool, which was taken away by the Inter-state Commerce Law.

Since the close of the year 1888 a tariff of freight rates established by the Railroad Commissioners of Iowa has gone into effect in that State, by order of the United States Court. The rates so established we believe to be unreasonably low, and it is to be hoped the Commissioners may be prevailed upon to modify them.

Remembering that the rates obtained in this country for railroad transportation has been declining for years, and are lower than anywhere else in the world, and remembering the enormous growth in population and the general prosperity of the people, in producing which the railroads have been so large a factor, it is difficult to understand what serious evil the recent railroad laws are designed to remedy. It is said that bad laws, when they are seen to be so, are usually repealed; and perhaps the evil of too much regulation by law will in time cure itself. Nevertheless, it cannot be denied that much the more serious feature of the railroad situation at present is the attitude of the law-making power, both national and state.

The increase in expenses for the year is due partly to the fact that we have operated an average of 4,859 miles in 1888, as against 4,239 miles in 1887. The new mileage is mostly in a new country, where the crops were little or nothing in 1887, and where we have not yet felt the effect of the better crops of 1888.

A large part of the increase in expenses for the year is attributable to the strike. The 2,500 men who left us on a few hours' notice had most of them been in the company's employ for years, where they filled important places and had become accustomed to one another and to their surroundings. They understood the rules of the train service, which are more or less difficult and complicated, and they formed a disciplined force, moving as an essential part of a great machine. This part of the machine was suddenly destroyed, and the task of re-constructing it had to be undertaken and performed without allowing the machine to stop or its efficiency to be impaired. But to accomplish this involved, and still involves, extra expense. It also involved for many months a vast amount of anxiety and overwork among our local officers and their subordinates in all branches of the service, and it is impossible to commend too highly their zeal, industry, and courage under very trying circumstances. To make the new force at least equal to the old in all respects, and in many respects superior, is merely a question of time. The material is excellent, but time is needed to make a homogeneous body, and to teach the new men various rules and methods which affect the expense account.

Your directors have given attention to the question of devising a plan by which men in the service may safely and cheaply provide for themselves and their families in case of injury or death; and it has been decided to organize a department, modelled on a similar department in the Pennsylvania Railroad organization, to be called the Chicago, Burlington & Quincy Railroad Relief Department. Those in the employ of the company desiring to obtain its benefits can do so at a moderate cost. The matter is wholly voluntary.

Considerable space in the President's report is given to an explanation of the origin of the Chicago, Burlington & Northern, and its relation to the C., B. & Q. The gist of it is that out of 90,975 shares of the stock of the former company the latter owns 30,975, the remainder being held by individuals, and that, therefore, it will be seen that the Chicago, Burlington & Quincy Company does not control the Chicago, Burlington & Northern Road. How much of the remaining 60,000 shares is held by stockholders in the C., B. & Q. is not stated.

TECHNICAL.

Bridge Notes.

The Jacksonville, Tampa & Key West road has just completed a bridge over the St. Johns River at Palatka, Fla., connecting the East Coast Divisions of the system with the Florida Southern division and the Jacksonville, Tampa & Key West. The Jacksonville Bridge Co. is making progress with the iron bridge being built over the St. Johns River at Jacksonville to connect the Jacksonville, St. Augustine & Halifax River road with the Jacksonville, Tampa & Key West.

The Western New York & Pennsylvania is building an iron Pratt truss bridge at Petroleum Centre, Pa., containing two spans of 150 ft. each. The company has recently completed Pratt truss bridges at Oil City and Larrabee, Pa., and at Portville, N. Y. The one at Oil City contains two 150 ft. spans.

The Commissioners of Laurel County, Ky., at London, are asking for bids on a 75 ft. iron bridge across Big Laurel creek at Hart's Ford.

The Atlanta Bridge & Axle Co., of Atlanta, Ga., is constructing for the Central of Georgia an iron bridge over the Chattahoochee River, near Columbia, Ala. The bridge has a pivot span of 230 ft. and a fixed span of 100 ft.

The Dry Run Viaduct on the line of the Shenandoah Valley at Dry Run, Va., will be completed within 30 days. It is being built by the Edge Moor Bridge Works, and is 1140 ft. long, 100 ft. high at the highest point and has Z iron legs. The Edge Moor Bridge Works has recently completed a bridge over the Shenandoah River, at Riverton, Va., for the same road. This bridge consists of four through pin-connected trusses, 160 ft. each, and two spans of through lattice girder, 90 ft. spans. The wooden bridges on this road are to be replaced by iron ones as fast as the earnings of the line warrant.

The Penn Bridge Co., of Beaver Falls, Pa., has just completed for the Pittsburg, Painesville & Fairport road a new iron swing bridge over the Grand River north of Painesville, O. The masonry work was done by A. J. Jolly & Sons, of Pittsburg.

The Wisconsin Central has just had replaced by the Edge Moor Bridge Works, of Wilmington, Del., three Post truss spans by three iron and steel spans, 197, 186 and 180 ft. long. This work was for the bridge over the Wisconsin River at Stevens Point, Wis. A. Gottlieb, of Chicago, Consulting Engineer of the Bridge Works, superintended the work.

The New York, New Haven & Hartford expects to complete the bridge over the Connecticut River at Lyme, on the Shore Line division, early this summer. The bridge is 1,124 ft. long, and contains five spans, three of which have been completed.

The Grand Trunk is erecting on its Midland Division, on the new location at Hastings, Ont., a new stone and iron bridge across the River Trent, to replace the present one. There are three fixed spans, each 80 ft. long, and one swing span, with two openings, 131 ft. over all. The superstructure is of plate girders.

C. J. Shultz, of Pittsburgh, is now erecting for the Scioto Valley Railroad, over the Little Scioto River, a through Pratt truss iron bridge, containing one span of 152 ft.

The Savannah, Florida & Western has completed a 137 ft. span bridge over the St. Mary's River, and has now under way a bridge over the Flint River with a span of 168 ft. and pivot bridges over the Ogeechee and Little Ogeechee rivers.

The New Brunswick road has commenced the work of removing the bridge across the St. John River at Andover. The bridge has five spans, Howe truss, each 161 ft. None of the erecting will be done until after the spring freshets.

The St. Louis, Arkansas & Texas is replacing five spans of a combination bridge over the Arkansas River by five iron and steel spans, each 200 ft. long.

The South Carolina road has placed draw-spans in its bridges over the Congaree and Wateree rivers.

The Somerset road proposes to erect a bridge across the Kennebec River at Carratunk Falls, Me.

The Youngstown Bridge Co. is being organized at Youngstown, Ohio, by B. F. Boyd, Hamilton Harris and others, to build a bridge works in Hasleton, a suburb of Youngstown, on the site formerly occupied by the Morse Bridge Works. The capital stock is $100,000.

A bill has passed one branch of the Ohio legislature which authorizes the Commissioners of Hamilton County to build a bridge at Cumminsville at a cost not to exceed $40,000.

The West Pineville Land & Improvement Co. proposes to build a steel bridge across the Cumberland River to connect the towns of West Pineville and Pineville, Ky.

The Hamilton Bridge & Tool Co., of Hamilton, Ont., has the contract for the iron work on the bridges over the Thames River at London and Chatham for the Canadian Pacific's Detroit extension.

Bids were recived until last week for the building of the bridge over the Grand Narrows for the Cape Breton road, and although no official announcement has been made of the letting of the contract, it has probably been awarded to Isbester & Reed, who are the contractors for the grading and masonry on the western section of the road between Point Tupper and Grand Narrows, 45 miles. The contract will amount to about $500,000, and the Dominion Bridge Co. is probably associated with Isbester & Reed in this contract.

Iron and Steel.

Only one proposal was received by the Navy Department for supplying the machinery of the armored cruiser Maine, now Building at the Brooklyn Navy Yard. This bid was made by the Quintard Iron Co. of New York (N. F. Palmer, Jr. & Co.), and amounted to $735,000.

The name of the Swindell Construction Co., Pittsburgh, Pa., engineers and contractors of regenerative gas furnaces, etc., has been changed to the Swindell & Smythe Co. The new company will continue the same business, and no change in ownership is made.

James Friend and Andrien Hoffstot, of Pittsburgh, with Lloyd Booth and Ralph J. Wick, of Youngstown, Ohio, have purchased the rolling mill of the Wheeler Iron Co. at West Middlesex, Pa., which has been idle for the past two years.

It is expected that the present week the entire new plant of the Allegheny Bessemer Steel Co., at Duquesne, Pa., will be in operation. The blooming mill has been in operation for several weeks. The buildings are entirely of iron. The converting and blooming mills are in one building, the dimensions of which are 75 x 200 ft. The mill proper is 68 ft. wide and 380 ft. long. In the converting mill there are two converters, each with a capacity of seven tons. To supply steam for the rail mill 20 boilers 44 in. in diameter and 24 ft. long have been put up in batteries of four, and so arranged that any two can be shut off. For the converting and blooming mills there are 16 boilers of similar dimensions.

Messrs. Rieble Bros., of Philadelphia, have just delivered to the Thomas Iron Co. a testing machine furnished with tools for testing metals up to a maximum strain of 100,000 lbs.

The Delaware, Lackawanna & Western has contracted with the Excelsior Iron Works Co., of Cleveland, O., for a plant of six Thornberg patent derricks, to be put in at the foot of Erie street, Buffalo, N. Y., for use in transferring iron ore from vessels to cars.

McGill, Manchester & Co., Limited, of Pittsburgh, recently shipped to the Allegheny Bessemer Steel Co., at Duquesne, Pa., a hot bed consisting of tables and hot and cold pull ups, weighing about 130,000 lbs. This firm is now building eight hydraulic cranes for the new steel works at Latrobe, Pa.

Riter & Conley, of Pittsburgh, will put up two iron buildings for the Westinghouse Electric Light Co., in St. Louis.

Carnegie, Phipps & Co., Limited, of Pittsburgh, are sending to the shipyards of Cramp & Sons, at Philadelphia, some of the largest armor plates ever made in this country. They have just turned out of their Homestead mill two plates which weighed in the aggregate nearly 19,000 lbs. They weighed 120 lbs. to the square ft., and their weight was 9,300 lbs. each.

The stockholders of the Sloss Iron & Steel Co. met in Birmingham, March 13, and elected the following officers: Thomas Seddon, President; J. P. Williams, Secretary and Treasurer, and Kenneth Robertson, General Manager.

The Columbia Rolling Mill Co. has disposed of a half-interest in the business to Drexel, Morgan & Co., bankers, and will put in additional machinery at the mill in Jersey City.

The Iron Bay Manufacturing Co. has received an order for 16 boilers for the Duluth Iron & Steel Co., which is now building furnaces at Duluth, Minn. The boilers are all to be 37½ ft. long and 4½ ft. in diameter, with two flues. They are designed for the use of gas as fuel.

Rogers, Brown & Co., who for the past eight years have occupied an office at 98 Dearborn street, Chicago, have removed to the Rookery Building. The firm represents 23 furnaces, mainly Ohio and Southern.

Frank A. Dennette has been appointed Mechanical Superintendent of the government gun foundry in Washington.

Carnegie, Phipps & Co. are enlarging their wire and nail plant, at Beaver Falls, Pa. The firm has placed an order for 50 machines with the National Machinery Co., of Tiffin, O.

The Rail Market.

Steel Rails.—No orders of any consequence are reported either in the east or west, the sales in both places not aggregating more than 6,000 tons. There are some inquiries in the market. Prices are firmer in the east at $27 at mill, or $27.50@$28 at tide water. Pittsburgh quotes $28@$28.50, and Chicago, $30@$30.50.

Old Rails.—A sale of 500 tons of old American rails has been made by a road near New York at $23. In Pittsburgh American tees are quoted nominally at $23@$23.50, and at Chicago old rails are held at $21.

Track Fastenings.—In New York the market is dull with spikes at $2 and angle bars at $1.75@$1.85 delivered.

THE SCRAP HEAP.

Notes.

The crews of the through passenger trains of the Chicago & Alton now run through between Chicago and St. Louis, 283 miles.

The Legislative Assembly of Dakota has passed a law providing for the establishment of a board of railroad commissioners.

Engineer Henry Cook, who had charge of the foremost engine of the excursion train which ran into a passenger train ahead of it at Mud Run, Pa., Oct. 10 last, was tried at Mauch Chunk, Pa., last week on a criminal indictment, and was acquitted. The other engineer, Major, and the brakeman of the preceding train, Hannigan, are on trial. Cook stated on the trial that his engine was coupled to the one behind it by a three-link coupling.

A train baggagemaster on the Chicago, Milwaukee & St. Paul has been arrested for taking from the conductor's papers tickets which had been collected and punched and defacing the punch marks by a large station baggage punch, after which the tickets could of course be sold again. It is stated that he has supplied scalpers with tickets for several months.

At Shannopin, Pa., on the Pittsburgh & Lake Erie, last week, a gang of freight car robbers attacked a train and badly beat one of the brakemen. They were driven off and the police notified, who soon after captured 9 of the men, who proved to be armed with revolvers and knives.

The following run was made on the Atlantic Coast Line this week with an engine with 18 by 24 cylinders: Train 14 left Wilmington on March 17, at 4:15 a. m., and arrived at Weldon, a distance of 162 miles, at 7:32, having made three stops, aggregating 16 minutes; average speed, 53$\frac{127}{141}$ miles per hour. This was the greatest speed ever attained on the Wilmington & Weldon.

Strikes.

Thirteen switchmen of the Chicago, Rock Island & Pacific went out on a strike March 15, because the place of one of the regular switchmen was filled by a non-union man. The strikers' places were soon filled without causing any delay to trains.

The night switchmen of the Union Pacific at Denver, Colo., twenty-three in number, struck on March 11, but their places were soon filled. Their grievance appears to have been trivial.

Floods.

On March 15, the New Jersey Southern and the Long Beach railroads in the northeastern part of New Jersey were badly damaged by high water. In consequence of a severe storm the waters of the Atlantic Ocean washed away the track of the last named road from Manahawkin Bay to Barnegat City. The New Jersey Southern track was covered with an immense quantity of sand and débris between Seabright and Highland Beach. North of the latter place it was said to be completely destroyed for half a mile. On March 16 the track of the Southern Pacific was washed out for half a mile near Ventura, in Southern California. There was a cloud-burst, which damaged a number of railroads in that vicinity and important excursion trains were hemmed in by landslides.

Car Shops Burned.

The car and paint shops of the Central Railroad of New Jersey at Ashley, about two miles from Wilkesbarre, Pa., were burned March 20. The buildings were of brick, erected in 1867, and were built in the form of a section of a round house. About 200 men were employed in the buildings. All of the workmen lost their tools. The buildings belonged to the Lehigh Coal & Navigation Co. and were leased by the Central of New Jersey. It is estimated that the loss on buildings will reach fully $60,000. There were several baggage and smoking cars, two passenger cars, freight cabooses, gondolas, and coal cars in the shops. All of these were consumed. The loss on rolling stock alone will foot up to nearly $30,000, and the loss on paints and materials will reach from $6,000 to $10,000. The buildings and stocks were insured, but the workmen had no insurance. The origin of the fire is unknown.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Chicago, Milwaukee & St. Paul, $2 per share on the preferred stock, payable April 26.

Cleveland & Mahoning Valley, quarterly, 2¼ per cent., payable March 10.

Connecticut River, quarterly, 2 per cent., payable April 1.

Lehigh Valley, quarterly, 1¼ per cent., payable April 15.

Nashville, Chattanooga & St. Louis, 1¼ per cent. on the preferred stock, payable April 10.

New York, New Haven & Hartford, quarterly, 2½ per cent., payable April 1.

Oregon Railway & Navigation Co., quarterly, 1½ per cent., payable April 1.

Pittsburgh, Youngstown & Ashtabula, 3½ per cent. on the preferred stock, payable March 25.

Providence & Worcester, quarterly, 2½ per cent., payable March 30.

Sunbury & Lewiston, semi-annual, 3 per cent., payable April 1.

Meetings

Meetings of the stockholders of railroad companies will be held as follows:

Atchison, Topeka & Santa Fe, annual meeting, Topeka, Kan., May 9.

Cairo, Vincennes & Chicago, special meeting, Cairo, Ill., April 25.

Calabas, Tucson & Northwestern, annual meeting, 32 Liberty Street, New York, April 2.

Chesapeake, Ohio & Southwestern, annual meeting, Memphis, Tenn., April 1.

Chicago & Alton, annual meeting, Chicago, Ill., April 1.

Chicago, St. Louis & New Orleans, annual meeting, Memphis, Tenn., March 29.

Cleveland, Chagrin Falls & Northern, special meeting, Cleveland, O., March 27.

Colorado Midland, annual meeting, Colorado Springs, Colo., April 1.

Louisville, Evansville & St. Louis, special meeting, Mt. Vernon, Ill., May 20.

Mississippi & Tennessee River, annual meeting, Memphis, Tenn., March 29.

New York, Ontario & Western, special meeting, 16 Exchange place, New York, April 8.

New York Central & Hudson River, annual meeting, New York City, April 17.

Tennessee Coal, Iron & Railroad Co., annual meeting, Tracy City, Tenn., April 1.

Toledo, Ann Arbor & North Michigan, annual meeting, Toledo, Ohio, April 17.

Valley (Ohio), annual meeting, Cleveland, Ohio, April 17.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Train Dispatchers' Association* will hold its second annual convention in Indianapolis, Ind., June 12. E. J. Peabody, 237 Franklin street, Chicago, is Secretary.

The *American Railway Master Mechanics' Association* will hold its next annual convention at Niagara Falls, beginning Tuesday, June 18, with headquarters at the International Hotel. All who wish to secure rooms should apply to Mr. A. H. Gluck, Manager, International Hotel, Niagara Falls, N. Y.

The *Master Car-Builders' Association* will hold its next annual convention at Saratoga Springs, N. Y., June 25. Hotel accomodations may be secured by applying to H. S. Clement, Manager Congress Hall.

The *National Association of Railway Surgeons* holds its annual convention in St Louis, Mo., May 2, 1889.

The *New England Railroad Club* meets at its rooms in the Boston & Albany passenger station, Boston, on the second Wednesday of each month.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m.

The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.

The *Central Railway Club* meets at the Tifft House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month at the House of the Society, 127 East Twenty-third street New York.

The *Boston Society of Civil Engineers* holds its regular meetings at its rooms in the Boston & Albany station, Boston, at 7:30 p. m. on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in St. Louis on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the house of the Club, 1,122 Gerard street, Philadelphia.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7.30 p. m. at its rooms in the Penn Building, Pittsburgh, Pa.

The *Engineers' Club of Kansas City* meets at Kansas City, Mo., on the first Monday in each month.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7.30 p. m. on the third Saturday in each month.

The *Civil Engineers' Club of Kansas* holds regular meetings on the first Wednesday in each month at Wichita, Kan.

Atlanta Accounting Officers.

In pursuance of the call issued by the President of the Association of American Railway Accounting Officers, a meeting of the Auditors in the vicinity of Atlanta, Ga., was held in that city on Wednesday, March 13, for the purpose of discussing the best method of settling joint through billing accounts. The roads of Alabama, South Carolina, Tennessee and Georgia were well represented in the meeting. Mr. J. C. Courtney, Auditor of the Western & Atlantic, was made Chairman, and Mr. S. C. Cooper, Treasurer of the Savannah & Montgomery, was Secretary. It was

"*Resolved*, That it is the sense of the Atlanta Territorial Committee of the Association of American Railway Accounting Officers that the interests of railway companies will be advanced by the settlement of freight balances between the auditing departments, rather than by continuing what are known as junctional settlements, and that the basis of these settlements should be on the 'Received' rather than the 'Forwarded' plan. This committee feels reluctance, however, in expressing a decided opinion upon these questions without further consideration by the Association."

The following committee was appointed to represent the territorial district of Atlanta at the general meeting of the association at Niagara Falls in July next: Carlton Hillyer (Georgia Railroad); William Hawn (E. T., Va. & Ga.), and Wilbur McCoy (South Florida).

Engineers' Club of St. Louis.

A regular meeting was held March 6, 31 members and 5 visitors being present. The chairman of the special committee on closer union of engineering societies made a long report, offering an amendment to the articles of association under which the present Association of Engineering Societies is organized. By this amendment the Chairman of the Board of Managers of the present Association is made Chairman of the Association, and on notice that the society desires the Association to pass on any question, he shall put the question to the different societies and receive and declare the vote. He shall also receive the reports of joint committees and submit them to the Association. In voting, a society shall be allowed as many votes as it has representatives on the present board of managers. In favor of the adoption of this amendment the committee made an argument of some length, saying, in general, that as the association for the purpose of a joint publication has been so successful, it may well be considered whether its objects could not be advantageously extended. There is much to do in the line of keeping special committees at work on questions of engineering policy, or the broader questions of investigation that cannot be covered by the labor of one man. It is thought that some concerted action in this wider field will be as beneficial as has been concert in the publication of papers. In relation to engineering practice, the subject of standards will furnish a broad field for co operative work. Every day practice brings up the inconvenience of lack of uniformity, and the introduction of standards of form would be a great help to the profession; standard tests of efficiency in engines, boilers and furnaces, standard tests of engineering materials and standard specifications, are desirable. There are times when concerted action on subjects requiring legislation is very desirable. The question of highway bridge reform is one that is now being pushed, and the course of such movements would be greatly increased by closer association. Among other objects for the Association the committee suggest harmony in boiler inspection and building laws and other municipal legislation falling in the province of the engineer. The questions of government works, the abatement of the smoke nuisance and the technical education of railroad employés are also suggested. This report was adopted as the sense of the club.

A paper by Mr. Winslow Allderice on improving the channel of the Mississippi was read by Prof. Johnson. No formal discussion of the paper was had, but Mr. Richard S. Elliott explained his plan for deepening the channel by means of water jets under high pressure.

General Passenger Agents' Meeting.

The semi-annual convention of the National Association of General Passenger and Ticket Agents was held in New York City March 19. General Passenger Agent James L. Taylor, of the Richmond & Danville Railroad presided. After routine business had been disposed of, it was resolved to form a new organization, under the name of "The American Association of General Passenger and Ticket Agents." The constitution and by-laws of the new organization are similar to those of the old organization. A report from the Committee of Railroad Accounting Officers was read by C. P. Leland, Auditor of the Lake Shore & Michigan Southern. Mr. Leland presented a resolution requiring all lines to check erroneous proportions, and make their claims on other roads within twelve months, or forfeit their claims against the company in whose accounts the error had occurred. The matter was referred to the Executive Committee to be reported on at the next meeting. A. V. H. Carpenter (Chicago, Milwaukee & St. Paul) sent a letter in which he asked that resolutions be passed requiring that the transportation of dead bodies by rail be turned over to the express companies. After some discussion this matter was also referred to the Executive Committee.

Resolutions of condoience were passed on the death of Henry Monett, also on the death of George A. Dadmun, ex-president of the association.

The following officers were elected for the coming year: President, George L. Connor, Old Colony; Vice-President, D. B. Martin; Secretary, A. H. Smith; Executive Committee, W. R. Busenbark, J. A. Fellows, J. W. Burdick, W. L. Danley, B. W. Wrenn, F. Chandler and James Barker.

It was decided to hold the next meeting at Atlanta, Ga., Sept 19.

PERSONAL.

—Mr. H. H. Filley, Consulting Engineer of the Mexican National Construction Co., who has been in the City of Mexico for some time past, has returned to Kansas City.

—Dr. William Garrard, the first manufacturer of tool steel in this country, died at the age of 86 in Fallston, Pa., March 19. He first engaged in the steel business in Cincinnati in 1840.

—Mr. James L. Willian, Traveling Passenger Agent of the Queen and Crescent System at Indianapolis, died there suddenly, March 12. He had been connected with the road in that capacity about a year.

—Capt. Seth W. Cox, a prominent railroad contractor, of Birmingham, Ala., was run over near Powderly, Ala., March 4 by a freight train, and received injuries which resulted in death the next day.

—Mr. W. D. Mann, Assistant General Passenger and Ticket Agent of the Chicago, Kansas & Nebraska has resigned, to take effect April 1, and has been succeeded by F. S. Boyd, formerly with the Minneapolis & St. Louis as General Passenger and Ticket Agent.

—Senhor Arthur Alvin, Chief Engineer of Permanent Way of the Dom Pedro II. Railroad, and one of the most distinguished engineers in Brazil, has recently been visiting this country for the purpose of inspecting the system of the Pennsylvania and other roads, and looking into the workings of some of our large factories. Among others, he visited the Phœnix Bridge Works, Gilbert Car Manufacturing Co., and Edison's Laboratory.

—Mr. W. H. Grout, who has been for many years the General Freight and Passenger Agent of the Cleveland, Lorain & Wheeling, died last week in Cleveland of heart disease. Mr. Grout was very well known in Cleveland, and universally liked among a wide circle of friends. Mr. Grout began railroad service as a clerk on the Atlantic & Great Western road over 25 years ago. On the organization of the Cleveland, Lorain & Wheeling, in 1871, he became its Auditor and Secretary.

—Mr. George H. Daniels, Vice-Chairman of the Central Traffic Association, has been appointed General Passenger Agent of the New York Central & Hudson River, to succeed the late Henry Monett. Mr. Daniels is 47 years old, and began railroad service when 16 years old as rodman on the North Missouri road. In 1872 he became General Freight and Passenger Agent of the Chicago & Pacific, and in 1880 General Ticket Agent of the Wabash. Since 1881 he has been commissioner of various traffic associations. He has held his present position three years.

—Mr. J. Lowrie Bell, formerly General Traffic Manager of the Philadelphia & Reading, has been appointed Superintendent of the United States Railway Mail Service. Mr. Bell resigned the position of General Traffic Manager of the Philadelphia & Reading last February, after a connection with the road extending over 30 years. He entered its service in 1857, when he was 20 years old, as a clerk in the Philadelphia freight station. He was General Agent in Philadelphia for three years, and General Freight Agent for 12 years. In 1880 he was made General Traffic Manager, holding the position until his resignation last March.

ELECTIONS AND APPOINTMENTS.

Alabama & Vicksburg.—This company, which is a reorganization of the Vicksburg & Meridian, has chosen the following officers: Charles Schiff, of Cincinnati, President; C. C. Harvey, Vice-President; H. H. Tatem, Secretary and Treasurer.

Baltimore & Ohio.—At the regular monthly meeting of the directors of the company this week, T. M. King was again elected Second Vice-President.

Battle Creek & Bay City.—W. K. Ackerman, Receiver, has appointed W. Irving Fox, General Superintendent of the St. Louis, Sturgis & Battle Creek and Battle Creek & Bay City roads, with office in Battle Creek, Mich. All communications pertaining to accounts and finances may, for the present, be addressed to the Receiver at Battle Creek.

Brooklyn, Bath & West End.—F. A. Stinard, formerly Master Mechanic of the New York & Greenwood Lake road, has been appointed Master Mechanic of this road, with office in Brooklyn, N. Y., to succeed N. Dickenson, resigned

Chautauqua Lake.—Jacob P. Crans has been appointed Assistant Superintendent of the road, with office at Jamestown, N. Y.

Chesapeake & Ohio.—Henry Pierce has been appointed Engineer of Maintenance of Way, with headquarters at Cincinnati, Ohio.

Chicago, Lodi & Southeastern.—At the annual meeting held recently, the following directors were elected: T. N. Rice, Rockville, Ind.; Homer Sewall, Covington, Ind.; R. J. Safely, Cedar Rapids, Ia.; J. J. Safely, Lodi, Ind., C. T. McEwen, Lodi, Ind.; M. Nye, Crawfordsville, Ind., and Otto Gresham, Indianapolis, Ind. J. J. Safely, President, and Otto Gresham, Secretary and Treasurer.

Chicago, St. Louis & Pittsburgh.—The annual meeting was held in Indianapolis March 20, and the following directors were elected: Alfred L. Dennis of New Jersey and James McRae of Pittsburgh to fill the places of two members whose term of service expired. The election of officers was postponed.

Chicago St. Paul & Kansas City.—F. B. Ross, Traveling Passenger Agent of the Chicago, Milwaukee & St. Paul, has been appointed Northwestern Traveling Passenger Agent of this road, with headquarters at St. Paul, Minn., to succeed E. B. McCuen, who is transferred to Cincinnati.

Chciago, Santa Fe & California.—F. C. Gay has been appointed General Freight Agent in place of Emmons Blaine, resigned. Mr. Gay is at present General Agent of the Atchison, Topeka & Santa Fe at Kansas City. W. F. White, Traffic Manager of the Santa Fe system west of the Missouri River and of the Atlantic & Pacific, has had his jurisdiction extended over the Chicago, Santa Fe & California and Gulf, Colorado & Santa Fe roads, and will move his headquarters from Topeka to Chicago April 1.

E. G. Nourse has been appointed Assistant Engineer, in charge of Maintenance of Way, with headquarters at Rialto Building, Chicago, and will report direct to the General Superintendent.

Cincinnati, Wabash & Michigan.—C. S. Blackman has been appointed Traveling Passenger Agent, with headquarters at 138 South Illinois street, Indianapolis, Ind.

Columbia Valley & Goldendale.—The following are the directors of this new Washington company: D. W. Pierce, E. B. Wise, Sol Smith, H. D. Young, R. O. Dunbar, Wm. Cumming, J. J. Golding, Jas. Nesbitt and C. S. Reinhart. The directors elected R. O. Dunbar, President; E. B. Wise, Vice-President; Wm. Cumming, Treasurer, and C. S. Reinhart, Secretary, all of Goldendale.

Current River.—The annual meeting was held in Kansas City last week and the following directors wese elected: George H. Nettleton, Wallace Pratt, J. S. Ford, J. P. Dana and J. H. Emmert.

Dallas Union Terminal.—The incorporators of this Texas company are: J. E. Henderson, B. S. Wathen, Henry Exall, O. P. Bowser, W. C. Young, F. M. Cockrell, Webster Snyder and W. S. Davidson.

Dubuque & Sioux City.—At the annual meeting held in Dubuque, Ia., March 18, the directors elected W. J. Knight, Dubuque, President; B. C. Woodruff, Elizabeth, N. J., Vice-President; A. Hockstaff, New York, Secretary; Henry De Wolf, Chicago, Treasurer; E. P. Skene, Dubuque, Assistant Secretary and Treasurer; M. Gilleas, Dubuque, General Superintendent; L. P. Morehouse, Land Commissioner; J. C. Welling, General Auditor.

Fort Scott, Wichita & Western.—At the annual meeting held in Wichita, Kan., March 6, directors were elected as follows: Jay Gould, George J. Gould, Russell Sage, A. L. Hopkins, H. Richards, Russell Harding and H. C. Hadley.

Geneva & Ettenville.—This New York company, whose incorporation was noted last week, has elected the following officers: George M. Diven, President; J. D. Thomas, Vice-President; Henry S. Redfield, Secretary, and D. M. Pratt, Treasurer, all of Elmira.

Grand Island & Northern Wyoming.—At the recent annual meeting five directors were elected as follows: G. W. Holdredge, C. D. Dorman, W. A. Higgins, J. G. Taylor and D. T. Beans. The same directors were elected for the Cheyenne & Burlington and the Eastern Wyoming.

Gulf, Colorado & Santa Fe.—At the annual meeting in Galveston, Tex., directors were elected as follows: George Sealy, Galveston, Chairman of the Board; Wm. B. Strong, Isaac T. Burr, A. W. Nickerson, Boston, Mass.; R. S. Willis and T. W. Jackson, Galveston.

Guntersville, Fort Payne & Chattooga Valley.—The officers and directors of this Alabama company are: President, L. A. Dobbs, Fort Payne, Ala.; Secretary and Treasurer, Henry B. Campbell, Fort Payne, Ala. Directors: F. Y. Anderson and John Howard, of Birmingham, Ala.; W. W. Dobbs, S. E. Dobbs, Dr. W. E. Quinn and M. W. Howard, of Fort Payne.

Hancock & State Line.—Marvin D. Wheeler, Hancock, N. Y.; James E. Childs, Wm. F. Dunning, John M. Shedd, Henry W. Poor, New York City; John Burton, Garden City, L. I.; James C. Anderson, Englewood, N. J.; Richard D. Rickard, Stamford, Conn.; Arthur L. Parmalee, Elizabeth, N. J.; John Fleming, William J. Martin, Brooklyn, N. Y.; Edward Canfield, Middletown, N. Y., and Williams Martin, East Branch, N. Y., are to be the directors for the first year of this New York company.

Hermosa, Hill City & Western.—The first board of directors of this Dakota company is as follows: Milton R. Maxson, Alvin S. Way, J. W. Streeter, Thomas L. Monaghan and C. J. Patton.

Illinois Central.—The stockholders of the road reconvened March 14, and elected C. M. Da Costa, of New York, to fill the vacancy in the Board of Directors, caused by the resignation of Hon. Levi P. Morton

Intercolonial.—N. Weatherston has been appointed Western Freight and Passenger Agent in place of R. B. Moodie, deceased. His headquarters will be at No. 93 York street, Toronto.

International & Great Northern.—T. W. Parks, of Tyler, Tex, has been appointed Superintendent of Telegraph.

Kansas City, Clinton & Springfield.—At the annual meeting held last week directors were elected as follows: George H. Nettleton, Wallace Pratt, J. S. Ford, J. H. Emmert, J. P. Dana, W. E. Dunn, W. J. Ferry, W. W. Fagan, and M. L. Sargent.

Kansas City, Fort Scott & Memphis.—The following directors were elected at the annual meeting last week: George H. Nettleton, H. H. Hunnewell, Nathaniel Thayer, Charles Merriane, Francis Bartlett, T. Jefferson Coolidge, Abbott Lawrence, B. P. Cheney, John A. Burnham, Allen Arnold, Charles W. Blair, O. E. Learnard and B. P. McDonald.

Kansas City, Fort Smith & Southern.—The following directors and officers were chosen at the annual meeting held in Neosho, Mo., March 12: Board of Directors: L. L. Bush, H. W. Bush, H. M. Fickinger, J. C. Cravens, B. F. Knabb; Officers: L. L. Bush, President and General Manager; H.

W. Bush, Secretary and Auditor; H. M. Fickinger, Superintendent, General Passenger and Freight Agent; Wm. J. Latta, Treasurer; S. R. Patterson, Chief Engineer; A. Felapouch, Consulting Engineer; and John N. North, Attorney.

Kansas City & Southeastern.—The annual meeting of the stockholders of the road was held in Kansas City, March 14, and the following directors were elected: Hon. John I. Blair, Blairstown, N. J.; D. C. Blair, Belvidere, N. J.; R. D. Blair, Clinton, Mo.; O. C. Ewart, Medicine Lodge, Kan.; John D. Vail, Blairstown, N. J.; James A. Blair, Kansas City, Mo.

Louisville & Nashville.—Charles Atmore, a son of Col. C. P. Atmore, General Passenger Agent, has been appointed Traveling Advertising Agent of the company.

Louisville, New Albany & Chicago.—Judge E. C. Fields, of Crown Point, Ind., has been appointed Chief Solicitor, vice G. W. Friedley, deceased. Hon. S. O. Bayless, of Frankport, Ind., has been made Assistant Solicitor, with headquarters at Lafayette, and E. F. Trabue, of Louisville, has been appointed Assistant Solicitor in charge of the Kentucky territory.

Mexican National.—The bondholders met in New York this week, in accordance with the provisions of the reorganization plan, and nominated the following directors, to be voted for at the annual meeting at Colorado Springs on April 1: William G. Raoul, J. A. Horsey, Charles C. Beaman, George Cappell, Lloyd Aspinwall and Eckstein Norton for the six nominees residing in the United States, and Emile Valesco and Manuel Saavedra as the nominees residing in Mexico.

The stockholders have nominated William J. Palmer and George F. Peabody, residents in the United States, and James Sullivan, resident in Mexico, as the representatives to be voted for at the annual meeting.

P. I. Milan has been appointed Assistant Superintendent of the Matamoras Division, with office at Matamoras, Mexico, to succeed W. W. Mayberry, resigned.

Montgomery & Sylacauga.—At a meeting in Montgomery, Ala., last week, the following Board of Directors was elected to serve for the ensuing year: J. W. Dimmick, B. Dunham, W. F. Vandiver, J. M. Carr, M. B. Houghton, H. A. Jones, Jos. Goetter, of Montgomery; P. A. Buyck, H. L. Williams, J. H. Parker, J. M. Parker, Wetumpka; H. G. McCall, Sylacauga, and D. T. Parker, Anniston, Ala. The directors elected the following officers: B. Dunham, President; H. G. McCall, Secretary, and H. A. Jones, Treasurer.

New York Central & Hudson River.—Charles H. McKee has been appointed an Assistant to Division Engineer Van Hoosen, and will have immediate charge of the engineering work in connection with the elevation and depression of the tracks in Buffalo.

George H. Daniels has been appointed General Passenger Agent, to fill the vacancy caused by the death of Henry Monett.

Northwestern Ohio.—At the annual meeting in Toledo, Ohio, the following directors were elected: Thomas D. Messler, J. N. McCullough, William Thaw, John W. Renner, R. F. Smith, George W. Layng and Frank Janes.

Ohio Valley.—John Menzies has been appointed General Freight and Passenger Agent, with office in Henderson, Ky., to succeed J. L. Murphy, resigned to accept service with another company.

Osage Valley.—The company has elected directors as follows: George H. Nettleton, Wallace Pratt, J. S. Ford, W. J. Terry, J. H. Emmert, W. E. Dunn, J. P. Dana.

Paducah & Tennessee.—The officers of this company are as follows: Col. T. H. Puryear, President, Paducah, Ky.; R. L. Ellison, Vice-President, Murry, Ky.; E. P. Noble, Secretary and Treasurer, Paducah, Ky.

Peoria, Decatur & Evansville.—At the annual meeting in Peoria, Ill., last week, James M. Devan, Heman Clark and Arnold Kummen were elected directors for three years, and R. A. Gambrill for two years.

Pittsburgh, Cincinnati & Columbus.—The following directors were elected at the annual meeting in Columbus, O., March 19: Geo. B. Roberts, Wistar Morris, J. N. DuBarry, H. H. Houston, Frank Thomson, William H. Barnes and John P. Green, of Philadelphia; J. N. McCullough, W. Thaw, Thomas D. Messler and James McCrea, of Pittsburgh; Robert Sherrard, Jr., and George W. McCook, of Steubenville.

Portland, Seattle & Northern.—The trustees of this new Oregon company are: Elijah Smith, James H. Benedict, J. S. Stoneley, John P. Hoyt, H. W. McNeill, Fred E. Sander and T. J. Milner.

Port Townsend Southern.—The following directors were elected at the annual meeting held in Port Townsend, W. T., last week: J. A. Kuhn, N. D. Hill, H. Landes, Charles Eisenbeis, L. B. Hastings, T. Jackman and William Payne. The directors elected officers as follows: President, J. A. Kuhn; Vice-President, L. B. Hastings; Treasurer, Henry Landes; Secretary, N. D. Hill.

Pueblo Rapid Transit & Circle.—The following are the incorporators of this new Colorado company: William Crook, James B. Orman, L. E. Moses, A. E. Graham and William Moses.

St. Louis, Arkansas & Texas.—The offices of Division Master Mechanic in Missouri, Arkansas and Texas have been abolished, E. W. Marshall, Pine Bluff, Ark., General Master Mechanic, assuming the duties of the positions.

St. Louis & Emporia.—The following directors and officers were elected at the recent annual meeting in Parsons, Kan.: D. Kelso, W. H. Martin, G. W. Hawkins, of Parsons; W. A. Johnson, of Garnett; E. G. Merriam and George C. Smith, of St. Louis; and George J. Gould, of New York. Officers: George J. Gould, New York, President; D. Kelso, Parsons, Ky., Vice-President; A. H. Calef, New York, Treasurer; W. H. Marton, Parsons, Kan., Assistant Secretary and Assistant Treasurer.

Spokane Falls & Northern.—A. A. Newberry, of Spokane Falls, is Vice-President and Alfred C. Chapin, of Brooklyn, N. Y., is Secretary and Treasurer; J. M. Buckley is Superintendent of Construction, and E. J. Roberts is Chief Engineer, both with office at Spokane Falls, Wash.

State Line & Oakland.—G. W. Howlenbeck, G. B. Johnston, Herbert B. Preston and E. J. Silkman are the incorporators of this Maryland company.

Waco & Brazos Valley.—At the annual election in Waco, Tex., the following directors were elected: William Cameron, E. Rotan, J. W. Mann, John H. Finks, W. D. Lacy, A. J. Caruthers, James B. Baker and James I. Moore.

West Virginia Central & Pittsburgh.—Emmons Blaine has been appointed Assistant to the President, with charge of the traffic department.

Wheeling & Harrisburg.—At the annual meeting, held last week in Wheeling, W. Va., the following officers were elected: R. H. Cochran, President; W. F. Peterson, Treasurer; O. B. Wood, Secretary; and these officers and Dr. George Baird, Joel Wood, H. F. Dunham and George Baird, jr., are the Directors.

Wichita & Colorado.—The following directors were elected at the annual meeting held recently in Wichita, Kan.: Geo. J. Gould, Edwin Gould, Russell Harding, J. H. Richards, Geo. C. Smith, M. W. Levy, A. W. Oliver, N. F. Neiderland and G. Phillips.

OLD AND NEW ROADS.

New Companies Organized.—Baton Rouge, Ponchatoula & Mobile.—Cincinnati, Alabama & Atlantic.—Columbia Valley & Goldendale.—Cumberland Mountain Coal.—Dallas Union Terminal.—Forest City & State Line.—Hancock & State Line.—McKeesport Connecting.—Portland, Seattle & Northern.—Port Townsend, Irondale & Hadlock.

Allegany & Kinzua.—This road is now nearly all completed from Smith's Junction, Pa., near Bradford, northwesterly through Freck's Mill to Redhouse, N. Y., on the Allegheny River, about 25 miles. It will soon be put in operation, lumber forming the principal traffic. The road connects at both Red House and Smith's Junction with the New York, Lake Erie & Western. C. D. Williams, of Bradford, Pa., is Superintendent.

Baltimore & Ohio.—The bill in the Pennsylvania Legislature to have the issue of Schuylkill River East Side bonds declared illegal will, it is said, be vigorously prosecuted, and an effort will be made to compel the company to complete the Philadelphia, Newton & Chester road. The report of the Schuylkill River East Side has been received by the Department of Internal Affairs. It shows that the road is operated by the Baltimore & Ohio, Baltimore & Philadelphia and Philadelphia & Reading companies, under a lease dated Nov. 6, 1885, by which the Baltimore & Ohio and Philadelphia & Reading guaranteed the principal and interest on $4,500,000. The cost of the road to Sept. 30, 1888, was $9,000,000. On May 19, 1886, it was consolidated with the Philadelphia, Newtown & Chester, the merger increasing the capital stock to $4,500,000. The 10 per cent. in cash was paid in, amounting to $450,000, and the sum now paid in is $4,050,000.

A dispatch from Erie, Pa., March 15 says: "The Baltimore & Ohio has entered into a contract with the Anchor Line Transportation Co., the headquarters of which are in Philadelphia, whereby all the lake traffic of the former will be handled by the latter and concentrated at Erie. The Baltimore & Ohio traffic will be taken from this point over the Erie & Pittsburgh to Pittsburgh. The new compact will add 50 per cent. to the business of this port and several new iron steamers will be built. Hitherto the traffic was delivered at Sandusky and other Ohio ports."

Baton Rouge, Ponchatoula & Mobile.—This company has been organized in Louisianna, with a capital stock of $40,000, to build a road from Baton Rouge to the Mississipi state line. C. S. Burt is President, E. J. Marsh is Vice-President, and A. R. Burt is Secretary.

Berlin & Green Lake.—This company has been organized in Wisconsin by W. H. Johnson, R. A. Christie and others of Berlin, to build a road from Berlin about 15 miles to Ripon.

Boston, Concord & Montreal.—The Supreme Court of New Hampshire has made a decision in two of the actions brought by the directors of the Boston, Concord & Montreal against the Boston & Lowell to recover possession of this road. The first action was a bill in equity asking for the revocation of the lease of the Boston, Concord & Montreal to the Boston & Lowell road, principally on the ground that at the time it was executed the latter line was not a corporation legally operating a railroad in the state. The Court held that the Lowell was then legally operating the Manchester & Keene road, and that the bill was not seasonably brought. The bill is dismissed. In the second case, it being a bill for the revocation of the lease upon the ground that its provisions had been violated by the subletting of the Boston, Concord & Montreal to the Boston & Maine, and for the appointment of a Receiver, the court held that there was no occasion to appoint a Receiver, as the line was operated by responsible parties. Upon the other points no decision was given, as the actions are still pending, but an opinion will probably be handed down next June.

Bowling Green Northern.—Warren County, March 16, voted the company a subscription of $150,000. The road is to be built from Bowling Green, Ky., northerly to a point on the Chesapeake, Ohio & Southwestern between Litchfield and Grayson Springs stations. The distance is about 35 miles, but no surveys have yet been made. Hon. J. Proctor Knott, of Lebanon, Ky., is President; H. Crump, of Bowling Green, is Secretary, and C. W. McElroy is Treasurer.

Castine and Bangor.—The company is negotiating with parties in New York who contemplate subscribing for the bonds and constructing the road. If these negotiations are successful, the line will probably be at once put under contract. It is to extend from Castine to Bangor, Me., 38 miles, and has been surveyed. The road will connect with the Canadian Pacific north of Bangor, and will connect the interior part of the state and the Canadian Pacific with the deep water harbor of Castine. A. M. Devereux, of Bangor, is General Manager.

Central of Georgia.—The extension of the Buena Vista & Ellaville road, from Buena Vista northwesterly to Columbus, Ga., about 33 miles, is now completed for a distance of 20 miles from Columbus, and work is in progress on the remaining section to Buena Vista. The Chattahoochie Brick Co., of Atlanta, Ga., has the contract for this extension. J. T. Millin, of Americus, Ga., has the contract for grading the line from the west bank of the Chattahoochie River into Columbia, Ala. C. O. Parker, of Savannah, is Chief Engineer of the line.

Central of New Jersey.—The company has awarded the contract for double tracking the Lehigh & Susquehanna division between Mauch Chunk and Wilkesbarre to Whitney & Burk, of Philadelphia. The contractors will begin work at Penn Haven Junction on a four-mile stretch before April 1.

The company is said to be engaged in surveying a short line from Glendon across the Delaware River to a connection with the Belvidere division of the Pennsylvania.

Chattanooga, Rome & Columbus.—Hon. G. Gunby Jordan, General Manager of the Georgia Midland & Gulf, has rendered his decision as special master in chancery in the case of the Chattahoochee Brick Co. against the Rome & Carrollton Construction Co. By the decree, verdict was taken for $163,000 against the Rome & Carrollton Co., the money to be paid this month. The suit was for the purpose of recovering $163,000 balance due to the Chattahoochie Brick Co., for the building of the Chattanooga, Rome & Columbus railroad, from Chattanooga to Carrollton.

Chattanooga Southern.—The annual meeting of this company will be held early in May, and it is expected that soon after its occurrence the contracts for grading the 75 miles of road from near Chattanooga to Alpine, Ala., will be let. The surveys for the line are now in progress, and will be completed next month. Some work on the line is now being done under the direction of the General Manager, J. C. Henderson, of Chattanooga.

Chicago, Kalamazoo & Saginaw.—The company is constructing an extension 14 miles long from Hastings, Mich., northeast. The road is now in operation from Kalamazoo to Hastings, 21 miles.

Cincinnati, Alabama & Atlantic.—The Alabama, Kentucky and Tennessee divisions of the Cincinnati, Huntsville & Birmingham have been consolidated under the above name. It is stated that sufficient funds have been secured to build the road, that the contract has been let and that work will begin at Huntsville, Ala., within 60 days. The road is to be built from that city to Tullahoma, Tenn, in a year. M. R. Campbell, of Tullahoma, is President.

Cleveland & Canton.—The company has completed a connection with the Pittsburgh & Western, at Kent, Ohio, which for the last month has been building. The connection necessary to make was nearly ¾ of a mile long, and the company was obliged to bridge the Cuyahoga River at large expense.

Cleveland & Chicago.—W. J. Hiland and I. Reynolds, of Cleveland, "representing a New York syndicate," have agreed to furnish the funds for building a road from Fremont, Ohio, westerly through Bowling Green to Napoleon, about 60 miles, if the residents along the proposed line will have it surveyed, and subscribe $85,000. It is claimed that the road will be built between these points this year, and then extended easterly from Fremont to Cleveland.

Columbia Valley & Goldendale.—This company has been organized in Washington Territory to build a road from the Columbia River to Goldendale, in Klikitat County, and thence northeasterly to a connection with the Northern Pacific, probably at Prosser, Yakima County, a distance of about 60 miles. Preliminary surveys will probably soon be made. The incorporators are residents of Goldendale.

Columbus, Lima & Milwaukee.—The final location of this road has been made from Columbus northwest to Defiance, Ohio, about 125 miles, and the preliminary survey has been made from Floodwood, Ohio, to Saugatuck, Mich., about 364 miles. From Floodwood the line would extend in a general northwesterly direction through Columbus, Marysville, Bellefontaine, Lima, Defiance and Bryan in Ohio, and thence through Kalamazoo and Allegheny to Saugatuck in Michigan. It is proposed to run a line of boats from Saugatuck to Milwaukee. The contract for the middle division between Columbus and Floodwood, Ohio, has been let, as already noted, to Stephen G. Clarke, of 1 525 North Halsteal street, Chicago. This company is formed by a consolidation of the Columbus, Lima & Northwestern, Columbus & Michigan and Columbus, Federal Valley and Floodwood roads. The line was originally projected by George Dempster. B. C. Faurot is President and R. P. Van Dusen is Chief Engineer, both with office in Lima, Ohio.

Columbus Southern.—A force of 400 laborers is now at work on this line and 45 miles have been graded. The Chattahoochie Brick Co., of 55 South Broad street, Atlanta, Ga., has the contract for the 87 miles between Columbus and Albany, Ga. G. G. Jordan, of Columbus, is General Manager, and William S. Greene, of Rome, is Chief Engineer.

Coudersport & Port Allegany.—This road, which extends from Coudersport to Port Allegany, Pa., 17 miles, is to be changed immediately from narrow to standard gauge. B. A. McClure, of Coudersport, is Superintendent.

Craig Mineral.—The locating survey has just been started for the line from Eagle Rock along Craig's Creek to Newcastle, Va., about 25 miles. From Newcastle it is intended to extend the road to some point on the New River Division of the Norfolk & Western. The road will be completed by the Sears Construction Co., which receives pay in stock and first-mortgage bonds, county subscriptions voted and mineral lands. No other contracts will be let, except for several iron bridges, the specifications for which have not yet been made. The line will develop one of the most extensive and valuable iron ore deposits in the South, and will afford an outlet for one of the richest and largest manganese deposits in the world. W. G. Sears is General Manager and F. C. Cooper is Chief Engineer, both of Eagle Rock, Va.

Dallas Union Terminal.—The company has been chartered in Texas to construct a belt road around the city of Dallas, Tex. The line will be about 12 miles long, and will connect with the Texas & Pacific near Trinity River. The capital stock is placed at $250,000.

Danville & New River.—This road extends from Danville west to Stuart, Va., 75 miles, and is in the hands of a Receiver, but its sale is prevented on account of a suit brought against it in the United States Supreme Court by the city of Danville to satisfy a claim of $60,000. The suit is now pending but a decision may not be given for some time. A representative of the bondholders has proposed to the city that the suit be compromised by the company paying a sum sufficient to pay the interest on the city's preferred stock, pending the decision in the suit, and that in the meanwhile consent to the sale of the road be given. The line is narrow gauge, and it is reported that the Atlantic & Danville wishes to secure control of it to form part of a line west of Danville.

Delaware & New England.—This company, whose application for articles of incorporation in the state of Delaware was noted last week, seems designed to include all the companies in the Poughkeepsie Bridge interest except the Pennsylvania, Poughkeepsie & Boston. A Philadelphia dispatch of March 18 states that the roads to be included in the consolidation are the Hudson Connecting Railroad, the Poughkeepsie Bridge Co., the Poughkeepsie & Connecticut, the Hartford & Connecticut Western, and the Springfield & Massachusetts railroads. These together make a line from Campbell Hall, N. Y., northeasterly, to Poughkeepsie; thence to Silvernail, N. Y., thence eastward to Hartford, Conn., with a branch 18½ miles long to Springfield, Mass. The proposed capital is $8,000,000, and it is stated that the consolidation will be effected about June 1.

Denison & Washita Valley.—Tracklaying was commenced, March 12, on a ten-mile section from Lehigh, Ind. Ter., in the direction of Denison, Tex., the southern terminus of the road. This section of 10 miles is all graded and bridged.

Des Moines Belt.—Surveys will soon be made by this local company for about three miles of new line to connect

the main line north of the Des Moines River bridge with the present terminus in Highland Park.

Dexter & Piscataquis.—Work has been commenced on this Maine road, which is to be built from Dexter to Foxcroft and Dover, 16½ miles, and it is expected the line will be completed by Oct. 15. J. B. Brown & Co., of St. Stephen, N. B., are the contractors.

Downington & Lancaster.—The final survey is being made for the extension of this road from New Holland westerly about 11 miles to Lancaster, and it is probable that construction work will be commenced when the survey is completed. The road is an operated line of the Pennsylvania.

Duluth, Red Wing & Southern.—Rails have been ordered for the graded section of road from Red Wing south to Zumbrota, Minn., a distance of 25 miles, and the line will be at once completed between these points. It has been surveyed from the Iowa state line near Sioux City, northeasterly through Southern Minnesota and Wisconsin, to within 60 miles of Duluth. The Red Wing, Duluth & Sioux City Construction Co. has the contract for building the road. F. W. Hoyt, of Red Wing, is President.

Eastern Kentucky.—The company is extending its road south a few miles from its present terminus at Willard, in Carter County, to Webbville, in Lawrence County.

Eau Claire, Mississippi & Lake Superior.—The company expects to let the contracts for constructing the road early in May. It has been surveyed from Eau Claire, Wis., southerly to Independence, Wis., and Winona, Minn., a distance of 66 miles, and the right of way has been nearly all secured. The contract for constructing 30 miles from Eau Claire was let last summer to W. H. Gleason, of Eau Claire. Charles E. Bussell, of Eau Claire, is Chief Engineer.

Evansville & Richmond.—It is stated that the company has decided not to build the road through Columbus, Ind., but to build it from Seymour to Madison or Greensburg. Columbus has but recently voted a large subscription to secure the road, and preparations had been made by the contractors to begin work.

Findlay Belt.—This company was formed to build a belt road around the city of Findlay, Ohio, connecting the various roads centreing there, but the scheme has met with so many difficulties that it has been temporarily abandoned.

Forest City & State Line.—The company has secured a charter in Pennsylvania to build a road, 28 miles long, to extend from Forest City, Susquehanna County, northeasterly to the Delaware River, at a point in Wayne County, opposite Hancock, N. Y. The capital stock is $1,080,000, and the president is Wm. H. Richmond, of Scranton.

Genesis & Obed River.—Construction work is now in progress on this Tennessee road, and about two miles have been completed from Genesis south. The road is being constructed from Genesis, Cumberland County, northeasterly 15 miles to a connection with the Cincinnati Southern at Sunbright, Morgan County. Capt. L. Beecher, Genesis, Tenn., is President.

Guntersville, Fort Payne & Chattooga Valley.—This company has been organized in Alabama to build a road from Guntersville, Marshall County, Ala., to Fort Payne, on the Alabama Great Southern, to intersect the Chattanooga, Rome & Columbus, in the Chattooga Valley in Georgia. Nearly all the right of way has been secured, and contracts will probably be let soon. The names of the officers are given in another column.

Hancock & State Line.—Articles of incorporation have been filed in New York by this company, giving it power to construct a road, three miles long, commencing at or near Hancock Station on the New York, Ontario & Western, and running thence to the state line between the states of New York and Pennsylvania at a point on the Delaware River, opposite Buckingham Township, in Pennsylvania. The Forest City & State Line has been chartered to continue the line in Pennsylvania. The capital stock is $200,000.

Hawesville & Pellville Mineral.—The survey was begun on March 15 for this road from Hawesville to a junction with the Owensboro, Falls of Rough & Green River, in Ohio County, near Haynesville, Ky., a distance of 18 miles. The company expects to let the contract for this line in June. The intention is to continue the line to Beaver Plain via Hartford, and to connect with the proposed Bowling Green & Northern road at Hartford if that line is built to that town. D. L. Adair, of Hawesville, is President.

Helena, Tupelo & Decatur.—Preparations are now being made to continue the survey from Tupelo, Miss., to Decatur, Ala. As already stated preliminary surveys have been made from Glendale, Miss., opposite Helena, Ark., to Tupelo, 145 miles. The company expects to secure the right of way, and large subsidies along its proposed route, issue bonds, and, says an officer, the company will then "go upon the money market for enough capital to build part of the road this next autumn and winter."

Hermosa, Hill City & Western.—This company has been organized in Dakota to build a road from Hermosa, Dak., on the Fremont, Elkhorn & Missouri Valley road, west to the Wyoming state line, a distance of 65 miles.

Huntington & Guyandotte River.—The survey for this road has been made from Huntington to Logan C. H., W. Va., a distance of 71 miles, and it is expected to let the contract for building this early in May. J. C. Caldwell, of Huntington, W. Va., is President.

International & Great Northern.—The suit of Jay Gould against the International & Great Northern in the Circuit Court at Tyler, Tex., was heard last week, and as the road did not deny the claims of the plaintiff, the court rendered judgment in his favor for $514,603, with 6 per cent. interest from the date of the promissory notes.

Kansas City, Lawrence & Nebraska.—A construction company is now being formed to build about 50 miles of this road from Topeka northwest to Westmoreland, Kan. The preliminary surveys have been made from Lawrence, Kan., to Grand Island, Neb., 279 miles, and from Randolph, Kan., northwest to Brantford, Kan., 33 miles. W. H. Breithaupt, Kansas City, is Chief Engineer.

Kingston & Adelphi.—The name of the Cincinnati Hocking Valley & Huntington, which extends from Kingston to Adelphi, O., and which was recently sold under foreclosure, has been changed to the above.

Knoxville, Cumberland Gap & Louisville.—Tracklaying on this road has been completed from Knoxville north for a distance of 30 miles to a point near the Clinch River. This leaves 63 miles to complete the road through the Cumberland Gap tunnel. The tunnel is 3,750 ft. long and is now about two-thirds completed. Work is in progress on the bridges over the Clinch and Powell's rivers. The former bridge has three spans of 150 ft. each and the latter one span of 160 ft. Work is also in progress on the Knoxville Southern, which is being built south from Knoxville about 100 miles to a connection with the Marietta & North Georgia, near the Georgia state line. Thomas McFarland, S. Condon and Keller & Love, of Knoxville, are contractors on this latter road. Maj. J. W. Wilson, of Knoxville, is Chief Engineer of both roads.

Lackawanna & Pittsburgh.—The road will be sold at Angelica, N. Y., on April 27, to satisfy the mortgages held by the Mercantile Trust Co. of New York, and Mills W. Barse. The road has not been operated for some time, and it is probable that the rails will be taken up.

Lake Erie, Alliance & Southern.—Suit has been begun in the Circuit Court at Cleveland against this road by James L. Dawes, Trustee. The suit is to foreclose a mortgage on the road, executed in 1880, to Henry B. Payne, as Trustee, to secure an issue of $150,000 bonds. The interest on these bonds has not been paid. On Dec. 20, 1888, J. L. Dawes succeeded H. B. Payne as Trustee.

Leamington & St. Clair.—The Michigan Central is said to have secured control of this road, which extends from Leamington, Ont., a summer resort on Lake Erie, northward 15 miles to Comber, where it connects with the Michigan Central.

Lehigh & Eastern.—This road was bought last week at sheriff's sale by Silas Newberger for $190,000. The road runs through Pike, Monroe and Carbon Counties, Pa., and Orange County, N. Y. The sale is claimed to have been brought about by irregular methods, and suits have been brought to compel a reinvestigation of all the proceedings leading to the sale. A suit for $600,000 has also been brought.

Louisville, Evansville & St. Louis.—Oliver Ferguson & Son, of Bedford, Ind., have, it is reported, been awarded the contract for building a new line from Mount Vernon to Belleville, Ill., which will connect this road with the Evansville & Terre Haute, by which it is now controlled.

A special meeting of stockholders will be held in Mt. Vernon, Ill., May 20, to consider the plan of the proposed consolidation with the Illinois & St. Louis, and the Belleville, Centralia & Eastern.

Louisville, New Orleans & Texas.—The company is constructing a branch from Slaughter northwest 17½ miles to Bayou Sara, La., on the Mississippi River, and where it will connect with the West Feliciana road, which runs north 25 miles to Woodville, Miss. Garvey Bros. & Kelly, of Memphis, have the contract. Surveys are being made from Rosedale, Miss., northeast to a connection with the main line either at Bobo or at Coahoma. If the connection is made at Bobo the line will be 30 miles long, and if at Coahoma it will be 45 miles long. Rosedale is on the Mississippi River and is the northern terminus of the Bolivar branch, 25 miles long, which was built last year from Lamont. A branch, 10 miles long, from Rolling Fork to Hampton, Miss., is also projected.

Louisville Southern.—Work has commenced on the extension from Lawrenceburg, Ky., easterly to Lexington, a distance of 24 miles, and it is expected that it will be completed by Sept. 1.

McKeesport Connecting.—This company has filed a charter in Pennsylvania to build a road from McKeesport to Port Perry, in Alleghany County, a distance of four miles. The capital stock is placed at $40,000.

Middletown & Hummelstown.—The contract for constructing this five mile Pennsylvania road has been let to H. H. Bechtel & Co., Newport, Pa. The line is to extend from Middletown on the Pennsylvania, north to a connection with the Philadelphia & Reading at Hummelstown. John W. Rife, of Middletown, is President.

Milwaukee, Lake Shore & Western.—Work is soon to be commenced on the Rhinelander extension, through the Flambeau Indian reservation and northwest to Hurley, Wis. Last year this line was completed from Rhinelander to the east side of the reservation, 27 miles, and from Hurley south five miles. The distance through the reservation is 14 miles; altogether 41 miles of road remains to be built to complete the line, which will then make the distance between the two places by the new line 73 miles. Henry & Balch, of Minneapolis, are the contractors.

Minnesota Northern.—The company expects to let the contracts in April or early in May for constructing 50 miles of road from Worthington north. It is also expected to let further contracts later in the season. The line is now surveyed from Worthington to Appleton, Minn., 100 miles, and the survey will be begun this Summer to continue the line to Fergus Falls, 150 miles further. D. F. Woolstencraft, of Fulda, Minn., is Chief Engineer.

Mobile, Jackson & Kansas City.—The location has now been finished for about 70 miles from Mobile, Ala., northwesterly. This brings the line to the middle of Perry County, Miss. It is expected to let contracts in July. H. A. Austill, Mobile, is Vice-President and General Manager.

Monongahela River.—The surveys for this road have now been nearly completed from Clarksburg, W. Va., northeasterly about 35 miles to Fairmount. This line would connect the Baltimore & Ohio with the Clarksburg, Weston & Glenville. Lines are being run on both sides of the Monongahela River, and as soon as the estimates are made it will be determined upon which side of the river to build. The Parkersburg Improvement & Construction Co., which is to build the road, will be organized at Parkersburg, W. Va., April 2, and, as already stated, the contract for grading will be let soon after. J. A. Fickinger, of Fairmount, W. Va., is Chief Engineer.

Monterey & Mexican Gulf.—Tracklaying on this Mexican road has been completed for the first 10 miles from Monterey, and is progressing rapidly on the 27 mile grade. It is expected to complete the line to Monte Morelos, 56 miles, by May 10. The line has been located for 120 miles from Monterey. Carlisle, Price & McGavock, of Pueblo, Col., have been awarded a large contract on the line. It is being built from Monterey southward to Tampico, on the Gulf of Mexico, a distance of over 325 miles. Gen. G. Trevino is President.

New Orleans, Natchez & Fort Scott.—The company now has a large force grading north from a point on the east bank of the Mississippi River, about 1½ miles below Natchez, through the bluffs to the city of Natchez. The locating survey has been made from Vidalia, La. (opposite Natchez), west to the Tensas River, 20 miles, and the preliminary survey has been made ready for location from the Tensas River north to Girard, on the Vicksburg, Shreveport & Pacific, and then west to Monroe, La. The distance from the river to Girard is 60 miles and to Monroe it is 80 miles.

Northern Maine.—The preliminary surveys for this road have now been completed from Mattawamkeag, northerly to Presque Isle, Me., a distance of 116 miles, and it is expected to let contracts in May or early in June for constructing the section from Mattawamkeag to Patten, 38 miles. The final location of the entire line will be made as early as possible, and the contract for building the whole may be let this year. Frederic Danforth, of Gardiner, Me., is Chief Engineer.

Northern Pacific.—The company has decided to build a line from Gallatin, westerly about 50 miles to Butte City, Mont. This line would cross the Missouri River and pass through the Jefferson and Boulder cañons. Last week an encounter occurred between employés of this road and the Union Pacific over the right of way through Jefferson cañon. The matter was settled as soon as it was brought to the attention of the higher officers. The Union Pacific had a partly graded road in Jefferson Cañon which the Northern Pacific uses, and the former road is granted traffic rights over the new line when it is completed.

Oneida, Oneonta & New York.—New York parties are soon to make a trip over the line of this proposed road with a view to furnishing the funds for building it, if their inspection proves satisfactory to them. W. F. Randall, of Oneida, N. Y., is Chief Engineer.

Orange Belt.—The company is constructing a short extension from the present terminus at Monroe southeast about four miles to Sanford, Fla., and the grading has now been completed.

Paducah & Tennessee.—McIntyre & Concannon, of St. Louis, have the contract for building 100 miles of this road, and it is expected that work will be commenced within 60 days. The line, as proposed, extends from Paducah, Ky., southeast, to Florence, Ala., through the towns of Benton, Murray, in Kentucky, and to Paris, Tenn., and thence through the rich iron country across Wayne County to Florence.

Pennsylvania.—The company has made a survey from a point on the Philadelphia Division, west of Philadelphia, direct to Bristol, on the New York Division, for a line which would enable it to run freight trains from the West, bound for New York, around the City of Philadelphia.

Portland, Seattle & Northern.—This company has filed articles of incorporation in Oregon to build the following lines of railroad: A line from a point at or near the city of Seattle, thence southerly to a point at or near Portland, Ore., a distance of 165 miles. A line from Seattle northerly via the town of Whatcom to a point on the northern boundary of Washington, at the town of Blaine, a distance of 100 miles. A road from a point on this last line, near where it crosses the Skagit River, thence up Skagit River to the mouth of Sauk River, thence easterly and northerly to Spokane Falls, a distance of about 300 miles. A line from the first-described road, near the crossing of the Skagit River, thence westerly via Fidalgo Island and Deception Pass to Adversity Head, on Whitby Island, W. T., a distance of about 35 miles. The capital stock is $5,000,000.

Port Townsend, Irondale & Hadlock.—This company has been chartered in Washington Territory to build a motor road from Port Townsend to the head of the bay at Port Townsend. J. A. Kuhn and W. Payne, of Port Townsend, are among the incorporators.

Richmond & Danville.—A force of over 100 convicts are at work on the Winston and Mocksville extension, and it is expected to complete the road from Winston southwest to the Yadkin River by June 1. The distance from Winston to Mocksville is 27 miles. A further extension southwest is under contemplation.

Richmond, Nicholasville, Irvine & Beattyville.—The contract will soon be let for constructing the 16 miles of road between Versailles and Nicholasville, Ky. This line has been surveyed. The locating survey is still in progress for the section between Richmond and Beattyville, and when completed this line will also be put under contract. As before noted D Shanahan & Co., of Nicholasville, Ky., have the contract for the 21 miles between Nicholasville and Richmond, and they are to have the work completed by Sept. 1. J. H. Pearson, of Nicholasville, is Chief Engineer.

Rockaway Valley.—Bids are asked for constructing the extension of this New Jersey road from New Germantown north to Pottersville, about four miles. A further extension to Peapack, Morristown County, is under consideration and will probably be built. It is expected to begin work on the extension about April 1. J. E. Melick, White House, N. J., is Chief Engineer.

Salem, Tillamook & Astoria.—The survey for this Oregon road will probably be soon commenced. The proposed route is from Salem, westerly to Tillamook, and then north to Astoria. It will pass through the towns of Eola, Dixie, Sheridan, Perrydale, and perhaps McMinnville, then through Tillamook, and thence down the coast to Astoria, which is an important and rapidly growing city on the bay, at the mouth of the Columbia River. It is also projected to build easterly through the state of Oregon, to Boise City, Idaho, or some other city easterly, where the company expects to connect with a road seeking an independent outlet to the Pacific Coast. The route traversed will be through the Willamette Valley, the richest agricultural portion of Oregon, where the road will pass through the Coast range of mountains, and along the coast of the Pacific Ocean it will open up and develop a very rich timber and coal belt. The County of Tillamook has also a large dairying industry. The surveys will be soon begun. Isaac A. Manning, of Salem, Oregon, is the chief promoter of the line.

San Antonio & Aransas Pass.—The extension to Houston, Tex., has been practically completed, but two miles of track remaining to be laid to finish it. It is thought the company will begin construction work on a section of the proposed extension to Alexandria, La., as soon as the Houston Division commences operation. The building of other extensions and branches is also under consideration.

Scioto Valley.—Tracklaying will soon commence on the extension from Portsmouth Junction to Sciotoville Junction, Ohio, a distance of five miles. The road is being graded by the company's men. A steam shovel is used on the heaviest part of the work.

Springfield, Shelbyville & Mt. Carmel.—It is expected to continue the survey for this road to Evansville, Ind., very soon. The line is now surveyed from Springfield to Effingham, Ill., 84 miles, and the right of way between these points has been guaranteed the company. It is expected to bond the line and let contracts for construction within two months. J. P. M. Howard, of Effingham, is President.

Spokane Falls & Northern.—Burns & Chapman, of Spokane Falls, W. T., have been awarded the contract for the earth and rock work on the 80 miles of road from Spokane Falls to Colville, W. T. C. B. King, of Spokane Falls, will build the trestles, bridges, etc. It is proposed to continue the road north from Colville to the Columbia River, about 120 miles from Spokane Falls. Several branches are also projected.

Suwannee River.—This company is surveying an extension from the present terminus on the Suwannee River,

southeast about 16 miles to a point in Suwannee County, Fla. The country traversed by the road is of subterraneous drainage, and no bridges or culverts have been required. No contracts will be let, the work being done by the company's own forces. P. W. O. Koerner, of Ellaville, is Chief Engineer.

Toledo, Ann Arbor & North Michigan.—The company will let contracts between April 1 and 15 for building 75 miles of road in Michigan. The company has at present 52 miles of road under contract to William Pickard and C. E. Warner. The terminus of the extension northwest from Cadillac will be Glen Arbor in Leelanaw County on Lake Michigan. George L. Davis, of Cadillac, is Chief Engineer.

Turtle Creek Valley.—The Pennsylvania Railroad, which now controls this line, has construction work in progress on the six miles between Moss Side and Murraysville, Pa. The road is surveyed 17 miles further to Saltsburg.

Union Pacific.—The company has secured running rights over the Norfolk branch of the Chicago, St. Paul, Minneapolis & Omaha, from Norfolk, Neb., northwest to Sioux City, Ia., a distance of 75 miles. The contract also includes the use of the terminal facilities in Sioux City. It is stated that the company has also secured running rights over the Northern Pacific, from Portland to Tacoma.

Vancouver, Klickitat & Yakima.—The grading on this road has been completed for 10 miles east of Vancouver and work is in progress easterly. Track will soon be laid on this section; over five miles of the road are now in operation.

Vicksburg & Meridan.—The name of this division of the Cincinnati, New Orleans & Texas Pacific, recently sold under foreclosure, has been formally changed to the Alabama & Vicksburg. The road still remains a division of this system of roads.

Virginia Western.—Two routes have been surveyed for this road, mention of which was made last week. One route is for a continuation of the Valley branch of the Baltimore & Ohio from Buchanan, Augusta County, Va., across the New River and to the Clinch Valley. The other route is from Eagle Rock, Botetourt County, on the Richmond & Danville via Craig's Creek to the Clinch Valley at the Virginia and Tennessee state line. The road is intended to form the Virginia division of the Tennessee Midland, but as yet no funds have been secured to build it. The work noted last week was to preserve the charter. Col. A. S. Buford, of Richmond, is President.

West Virginia & Pennsylvania.—This company has filed a charter in West Virginia to build a road from Rowlesburg, Preston County, to the Pennsylvania state line. The principal office will be at Kingwood, W. V., and the incorporators are George W. Marsden, of Philadelphia, and W. M. Dawson and others of Preston County, W. Va.

Wilmington, Onslow & East Carolina.—The charter for this road has been transferred to Thomas A. McIntyre, of New York, and it is thought probable that work on the line will be soon commenced. The road is projected to extend from Wilmington to New Berne and northeasterly to Jacksonville, Onslow County, N. C. The company has been voted several large county subsidies.

TRAFFIC AND EARNINGS.

Traffic Notes.

The Trunk Line Executive Committee has agreed to abolish all existing commodity tariffs, and it has been resolved that no new ones shall be issued without first securing the approval of all the members of the Trunk Line Association.

The reduction of the rate on flour between St. Paul and Chicago by the Chicago, Burlington & Northern was followed by a notice of reduction from the Chicago, Milwaukee & St. Paul. On March 14 the Burlington gave notice of a further reduction of 7½ cents per 100 lbs., the reason being that the roads from St. Paul Eastward, via the Sault Ste. Marie, have made a rate through to the seaboard on that basis.

The Chicago, St. Paul, Minneapolis & Omaha has notified the roads in the Western Freight Association of its intention to establish the same rates on merchandise classes between Nebraska points and Duluth as applies between those points and Chicago.

The general managers of the lines in the territory of the Inter state Railway Association have organized the auxiliary associations. The Western and Northwestern section and the Southwestern section of the Western Freight Association remain unchanged, with the exception of some additions to the territory of each. The trans-Missouri section embraces all the territory west of the Missouri River, covering both freight and passenger business. The headquarters of the trans Missouri Association will be at Kansas city and the agreement becomes effective April 1.

A spark from a locomotive setfire to a bale of cotton at the freight house of the Columbus & Rome road in Greenville, Ga., March 15, and 13 bales were destroyed.

Vice Chairman Daniels, of the Central Traffic Association, has issued a call for a mass-meeting of all general passenger and ticket agents and compilers of joint passenger-rate sheets in the United States, to be held at the Burnet House, Cincinnati, March 27. Action will be taken in reference to the publishing and posting of rates, as recently ordered by the Interstate Commerce Commission. Mr. Daniels has also secured from the Commission an appointment for a conference on the subject on March 21, in Washington, at which representatives of the trunk lines, New England Southern Passenger, Western States Passenger, Transcontinental, International and Central Traffic associations will be present.

An injunction has been granted at Waverly, Ia., against the Burlington, Cedar Rapids & Northern, restraining it from allowing the use of its freight cars as distributing warehouses by consignees for the delivery of beer coming over the road from outside the state.

Special party tickets at a uniform rate are now kept on sale by the Pennsylvania on the whole of its system east of Pittsburgh and Erie. Parties of 10 or more persons to one destination on the same train can buy a single ticket for the party at the rate of two cents per mile per passenger.

Inter-state Commerce Commission.

HEARING ON EXPORT RATES.

Representatives of the trunk lines and their connections, of the Richmond & Danville, Norfolk & Western, Chesapeake & Ohio and East Tennessee, Virginia & Georgia roads, and of certain commercial bodies were examined by the Commission at Washington on March 16 and 18 concerning the methods of the roads in making export rates. From the testimony of officers of the Grand Trunk, Wabash Western and others, it appeared that rates on grain and flour from Chicago and other Western points to European ports have been very irregular for several months past. The through rates necessarily vary from day to day by reason of the variation in the ocean rate. Mr. Sergeant, of the Grand Trunk, stated that the through rate was divided between his road and the ocean carrier on uniform proportions, regardless of the fluctuations. The same rule was followed in the case of import freight. Mr. Hayden, of the New York Central, said that the inland portion of export rates was not varied by his road. The Wabash Western admitted that its export rates had been varied frequently and without notice. Officers of the New York, Ontario & Western, and of the Lehigh Valley, said that they had carried no export grain for two or three months. This appears to have been a result of the strict maintenance of tariffs on these roads. At the request of Southern railroad officials the Commission concluded to adjourn the hearing two weeks in order to give them an opportunity to be heard.

At the conclusion of the session on Monday Chairman Cooley made a brief address to the gentlemen present, which is reported as follows:

Here is the law, and it is not for you hereafter to say to us that there are practical obstacles in the way of complying with it, that you would lose business by so doing, and all that sort of thing. We do not wish to do anything to make you lose business; at the same time we cannot accept it as a valid excuse that if you obey the law you will thereby lose business. The time ought to be considered as gone by when a manager can come to us, and say: "I named this rate, and I did it regardless of law, because my competitor had done the same thing." There is no excuse for that practice. If a wrong is done by one road to the injury of another, the proper method of redress is not to duplicate the wrong, but to go before the common authority, whether it be the Commission or the voluntary association, with complaint of the wrong. One crime in railroad circles is no more to be excused by another than one theft is to be justified by another; and it ought to be just as discreditable to violate a criminal law which affects railroad managers in order to make money for their roads as it is to violate a criminal law in the appropriation of private property. I trust after what has been said we shall not hear complaints like those we have been hearing all along, while this investigation remains over. I trust, also, that if there is occasion because of what has been done to make complaint that the parties will not take the remedy into their own hands. One of my brethren remarks, very properly, that while we continue this case for two weeks, the law is not suspended. That remains in force, and its penalties remain in force.

Coal.

The coal and coke tonnage of the Pennsylvania, originating on lines east of Pittsburgh and Erie, for the week ending March 9, and the year to that date, was as follows:

	Coal.	Coke.	Total.
Total for week ending March 9.	206,616	85,004	291,620
Total for year 1889 to date	1,992,007	859,682	2,851,689
Total for year 1888 to date	2,311,133	770,855	3,081,988

The anthracite coal tonnage of the Belvidere division of the United Railroads of New Jersey division for the same periods was as follows:

	1889.	1888.	Inc.
For week ending March 9	28,206	23,049	I. 5,156
For the year 1889 to date	254,773	310,920	D. 56,146

The Cumberland coal trade for the week ending March 16, amounted to 54,886 tons, and for the year to that date 525,020 tons.

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

ATCHISON, TOPEKA & SANTA FE RAILROAD AND AUXILIARY LINES.

Month of January, 1889:

	Mileage Oper.	Gross Earn.	Oper. Expen.	Net Earn.
Atchison, Topeka & Sante Fe and leased lines (including Chicago Line, St. Joseph, Chicago, Kansas & Western, New Mexico & Arizona, and Sonora roads)	4,932	$1,412,958	$1,033,657	$379,302
St. Louis, K. C. & Col.	61	2,897	6,233	def. 3,426
Gulf, Col. & Sante Fe.	1,058	243,450	266,436	def. 22,986
California Central	269	94,597	74,950	19,647
California Southern	211	80,951	74,899	6,052
Total	6,531	$1,834,764	$1,456,175	$378,589
Roads owned jointly with other companies:				
Atchison Company's one-half	583	144,411	135,086	9,325
Grand total	7,115	$1,979,175	$1,591,261	$387,914

COMPARATIVE STATEMENT—ALL LINES.

	Net earn.	Mileage.	Net earn. per mile.
Jan., 1889	$387,914	7,115	$54.52
Jan., 1888	314,137	6,321	49.70
Increase Jan., 1889	$73,777	794	$4.82

NEW YORK CENTRAL & HUDSON RIVER.

Three months to March 31:	Estimated. 1889.	Actual. 1888.
Gross earnings	$8,042,000	$8,152,796
Oper. expenses	5,211,000	5,812,028
Net earnings	$2,531,000	$2,350,768
Fixed charges	1,963,000	$1,954,860
Profit	$568,000	$395,908
Dividend	894,000	894,283
Deficiency	$326,000	$498,375
Six months to March 31:		
Gross earnings	$17,213,000	$18,173,022
Oper. expenses	11,483,000	12,272,538
Net earnings	$5,730,000	$5,900,484
Fixed charges	3,926,000	3,909,720
Profit	$1,804,000	$1,990,764
Dividend	1,788,000	1,788,566
Surplus	$16,000	$202,198

NASHVILLE, CHATTANOOGA & ST. LOUIS.

Month of February:		
Gross earnings	$275,627	$248,835
Oper. expenses	158,617	146,535
Net earnings	$117,010	$102,300
Interest and taxes	$72,337	$62,735
Improvements	2,670	12,934
	$75,007	$75,669
Surplus	$42,003	$26,631
Eight months to Feb. 28:		
Gross earnings	$2,203,972	$2,121,279
Oper. expenses	1,283,463	1,187,119
Net earnings	$920,509	$934,160
Interest and taxes	$581,230	$498,942
Improvements	39,045	92,512
	$620,275	$591,454
Surplus	$300,234	$342,706

DENVER & RIO GRANDE WESTERN.

Year to Dec. 31:	1888.	1887.	Inc. or Dec.
Gross earnings	$7,668,654	$7,983,419	D. $314,765
Oper. expenses	5,104,681	4,742,048	I. 462,633
Net earnings	$2,563,972	$3,241,370	D. $677,398
Other income	.....	25,388	D. 25,388
Total net	$2,563,972	$3,266,758	D. $702,786
Interest, taxes, etc	1,878,716	2,696,708	I. 182,008
Balance	$685,255	$1,570,050	D. $884,795
Div. on pref. stock	295,625	1,182,500	D. 886,875
Balance	$389,630	$387,550	D. $2,080
Income ap. to bet	240,906	250,524	D. 9,618
Surplus	$148,724	$137,026	I. $11,698

ILLINOIS CENTRAL.

Two months to Feb. 28:			
No. of miles	2,175	1,953	I. 232
Gross earnings	$2,040,999	$1,873,271	I. $167,728
Oper. expenses	1,330,604	1,379,656	D. 49,052
Net for 2 mos	$710,395	$194,215	I. $216,780

PITTSBURGH, CINCINNATI & ST. LOUIS.

Year to Dec. 31:	1888.	1887.	
Gross earnings	$5,388,547	$5,808,378	D. $419,831
Oper. expenses	4,193,011	4,017,218	I. 175,793
Net earnings	$1,195,536	$1,791,160	D. $596,624
Other income	5,317	5,777	D. 460
Total income	$1,200,854	$1,796,937	D. $596,083
Int., rentals & def. on leased lines	1,295,108	1,193,989	I. 102,119
Deficit	$95,254	sur. $602,948	D. $507,694

Month of January:	1889.	1888.	Inc. or Dec.	P.c.
Cairo, Vin. & Chic	$54,064	$56,452	D. $2,388	4.4
Net	15,108	11,501	I. 3,607	31.3
Cent. Br. Union Pac.	57,999	64,866	D. 6,867	11.8
Net	9,999	def. 4,079	I. 5,920	145.0
Chesapeake & Ohio.	348,059	382,241	D. 35,182	10.1
Net	74,330	81,843	D. 7,513	10.1
Ches., Ohio & S. W.	170,326	160,760	I. 9,566	5.9
Net	75,544	53,368	I. 22,176	41.9
Chi., Bur. & No	158,628	108,835	I. 49,793	45.7
Net	50,408	def. 7,252	I. 43,156	....
Denv. & Rio Gr. W.	121,900	91,359	I. 30,541	33.4
Net	44,127	15,315	I. 28,812	....
Den., So. Pk. & Pac.	57,015	74,625	D. 17,610	38.8
Net	def. 27,808	def. 23,995	D. 3,813	15.9
Ft. Worth & Den. C.	83,336	63,503	I. 19,833	31.0
Net	21,892	22,388	D. 496	2.2
Grand Trunk of Can.	1,378,297	1,212,844	I. 165,453	13.7
Net	286,717	190,866	I. 95,851	5.0
Chi. & Grand Tr.	252,830	276,799	D. 23,969	9.4
Net	55,026	53,151	I. 1,875	3.5
Det., Gr., H. & M.	76,140	80,694	D. 4,554	5.9
Net	7,265	7,575	D. 310	4.2
Iowa Central	116,661	98,272	I. 17,389	17.6
Net	21,248	def. 886	I. 22,134	....
Kentucky Central	68,848	72,709	D. 3,861	5.6
Net	18,194	25,503	D. 7,309	40.1
Minn. & St. Louis	83,390	86,600	D. 3,210	3.8
Net	18,538	def. 1,376	I. 19,914	....
Missouri Pacific	922,435	809,241	I. 113,194	13.9
Net	210,532	103,971	I. 106,561	102.0
Ohio River	38,093	26,984	I. 11,109	41.1
Net	12,747	9,676	I. 3,071	31.7
Ore. Ry. & Nav. Co.	356,199	272,598	I. 83,601	30.6
Net	def. 9,242	22,245	D. 31,487	....
Oregon Short Line	231,129	133,150	I. 97,979	73.5
Net	106,758	30,016	I. 76,742	....
Southern Pacific Co.:				
Gal., Har. & S. Ant.	325,960	276,065	I. 49,895	18.0
Net	63,995	41,598	I. 23,401	56.2
Louisiana West	94,856	64,023	I. 30,833	48.1
Net	50,804	24,207	I. 26,597	109.0
Morgan's L. & Tex.	445,217	472,266	D. 27,049	6.0
Net	149,608	172,687	D. 23,079	15.4
N. Y., Tex. & Mex.	9,006	7,827	I. 1,779	22.7
Net	def. 10,005	def. 4,698	D. 14,703	....
Tex. & N. Orleans	126,460	95,586	I. 30,874	32.2
Net	34,207	15,965	I. 18,342	115.0
Tot. Atlan. System.	1,002,100	915,767	I. 86,333	9.4
Net	248,608	249,654	I. 38,954	15.6
Utah & Northern	161,983	120,150	I. 41,833	34.8
Net	33,835	24,062	I. 97,710	40.6
*Union Pacific	2,457,676	2,168,544	I. 289,132	13.3
Net	537,256	404,731	I. 132,525	32.7
Total (gross)	$9,115,819	$8,107,124	I. $1,008,695	12.4
Total (net)	2,139,689	1,517,932	I. 621,757	40.9

*Includes operated lines and lines in which Union Pacific has a one-half interest.

Early reports of monthly earnings are usually estimated in part, and are subject to correction by later statements.

East-bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, March 16, amounted to 68,016 tons, against 70,449 tons during the preceding week, a decrease of 2,433 tons, and against 55,852 tons during the corresponding week of 1888, an increase of 12,164 tons. The proportions carried by each road were:

	W'k to Mar. 16.		W'k to Mar. 9.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	5,777	8.5	5,520	7.8
Wabash	5,766	8.5	7,200	10.2
Lake Shore & Michigan South.	6,498	9.5	7,531	10.7
Pitts., Ft. Wayne & Chicago	6,590	9.7	7,125	10.1
Chicago, St. Louis & Pitts	8,287	12.2	9,002	12.8
Baltimore & Ohio	3,317	4.9	3,227	4.6
Chicago & Grand Trunk	16,817	24.7	16,401	23.3
New York, Chic. & St. Louis	5,888	8.7	6,522	9.3
Chicago & Atlantic	9,076	13.3	7,921	11.2
Total	68,016	100.0	70,449	100.0

Of the above shipments 4,391 tons were flour, 31,550 tons grain, 3,288 tons millstuff, 4,672 tons cured meats, 3,959 tons lard, 7,535 tons dressed beef, 1,167 tons flaxseed, 888 tons butter, 1,508 tons hides, 84 tons wool, and 5,004 tons lumber. The three Vanderbilt lines carried 26.7 per cent., while the two Pennsylvania lines carried 21.9 per cent

Cotton.

The cotton movement for the week ending March 15 is reported as follows, in bales:

Interior markets:	1889.	1888.	Inc. or Dec.	P.c.
Receipts	39,280	26,114	I. 9,166	35.0
Shipments	70,012	43,752	I. 26,260	60.0
Stock	215,270	284,870	D. 69,600	32.3
Seaports:				
Receipts	80,026	47,333	I. 32,693	69.0
Exports	119,613	66,691	I. 52,922	79.3
Stock	685,780	767,978	D. 82,248	11.0